

PAPERS AND ADDRESSES

BY

LORD BRASSEY



PAPERS AND ADDRESSES

BY

LORD BRASSEY, K.C.B., D.C.L.

NAVAL AND MARITIME

FROM 1872 TO 1893

ARRANGED AND EDITED BY

CAPTAIN S. EARDLEY-WILMOT, R.N.

VOL. I.

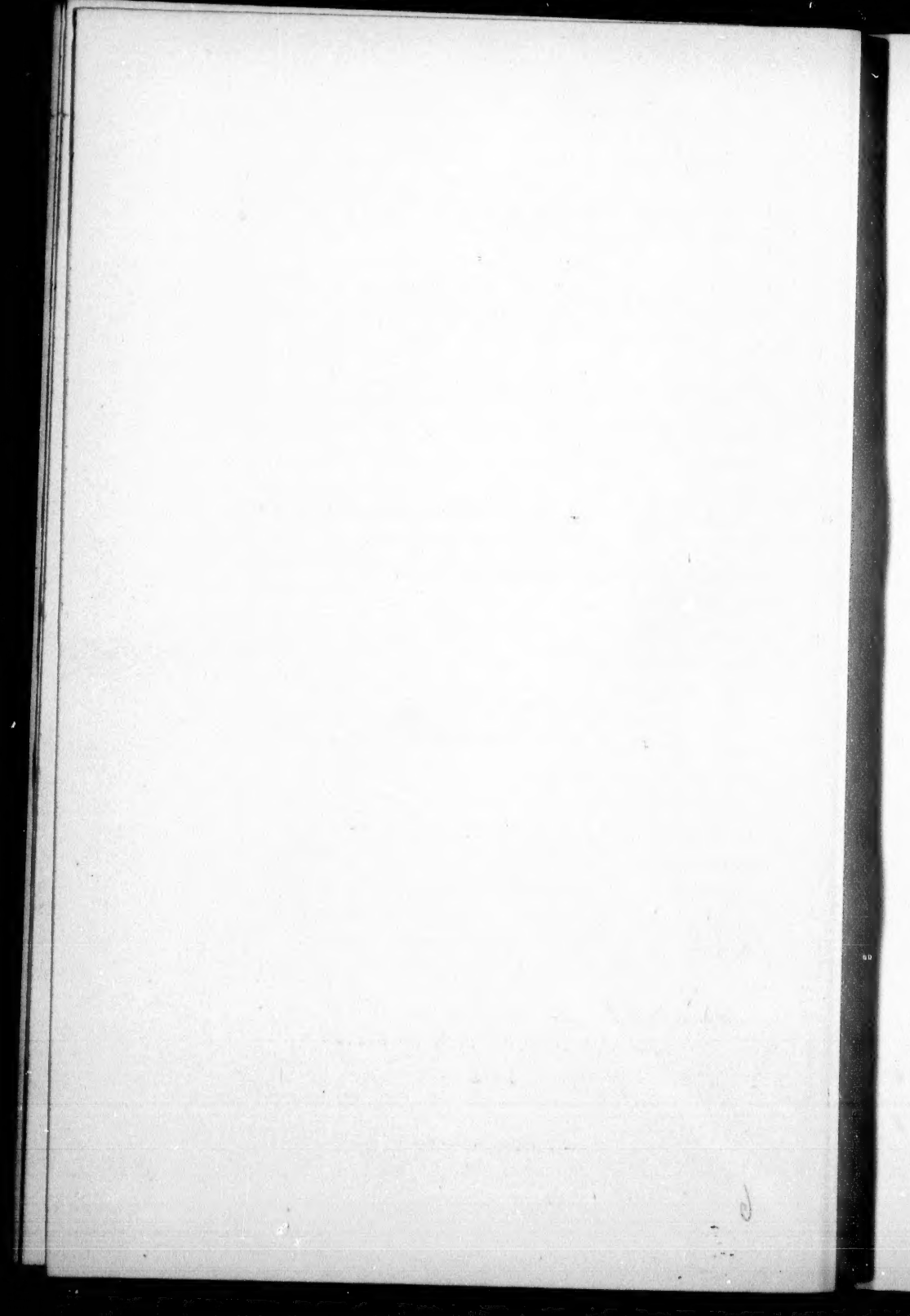
LONDON

LONGMANS, GREEN, AND CO.

AND NEW YORK : 15 EAST 16th STREET

1894

All rights reserved



EDITOR'S PREFACE

THESE two volumes comprise a selection of Lord BRASSEY'S Papers and Addresses on Naval and Maritime Affairs, extending over a period of twenty years.

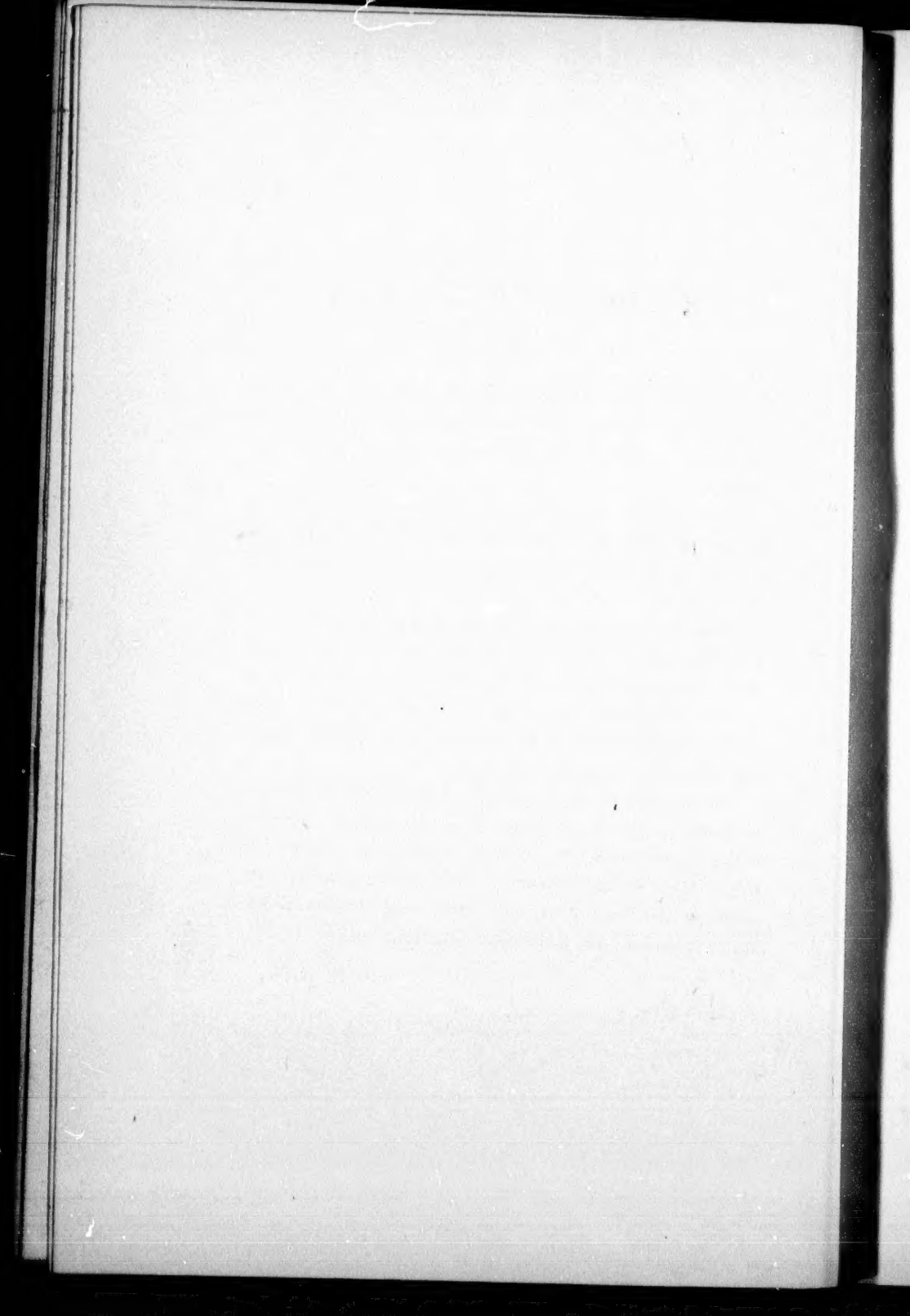
They will be found to include nearly every subject connected with our Fleet and Mercantile Marine, in addition to other questions relating to the Defence of the Empire.

The Author has not only taken a great interest in these important matters, but having served in the Naval Administration, and also acquired by long practical experience a knowledge of all that relates to the sea, he has qualified himself to speak with an authority which few civilians can claim to possess.

To my hands Lord BRASSEY, on the eve of his mission to India, confided the task of arranging and editing these papers, with full power to make such excisions as might seem to me desirable. This power I have exercised to the best of my judgment, and for any shortcomings on his part the Editor asks indulgence.

S. E.-W.

March 1894.



CONTENTS

OF

THE FIRST VOLUME

PART I

ADMIRALTY ADMINISTRATION

	PAGE
I. RECENT NAVAL ADMINISTRATION. PAMPHLET, 1872	1
II. DOCKYARD ADMINISTRATION. SPEECH, HOUSE OF COMMONS, 1873	16
III. NAVAL EXPENDITURE, ETC. SPEECH, HOUSE OF COMMONS, 1874	26
IV. OUR NAVAL STRENGTH AND POLICY. REPRINT, 'CONTEMPORARY REVIEW,' 1876	30
V. NAVAL SHIPBUILDING. SPEECH, HOUSE OF COMMONS, 1878	47
VI. NAVAL CONSTRUCTION. SPEECH, HOUSE OF COMMONS, 1879	57
VII. DOCKYARD ADMINISTRATION. SPEECH, HOUSE OF COMMONS, 1879	65
VIII. NAVAL ADMINISTRATION. LETTER TO 'TIMES,' 1880.	75
IX. EGYPT AND THE SUEZ CANAL. ADDRESS AT SHEFFIELD, 1882	82
X. NAVAL SHIPBUILDING. ADDRESS AT BIRKENHEAD, 1882.	86

	PAGE
XI. THE NAVY. SPEECH, HOUSE OF COMMONS, 1883	93
XII. NAVAL CONSTRUCTION. ADDRESS AT PORTS- MOUTH, 1884	99
XIII. ENGLISH AND FRENCH SHIPBUILDING. ADDRESS AT HASTINGS, 1884	108
XIV. STATEMENT ON THE NAVY. SPEECH, HOUSE OF COMMONS, 1884	119
XV. THE ADMINISTRATION OF THE NAVY, 1880-85. REPRINT, 'NINETEENTH CENTURY,' 1885	141
XVI. THE BRITISH NAVY. LETTER TO 'TIMES,' 1888	173
XVII. NAVAL EXPENDITURE. SPEECH, HOUSE OF LORDS, 1888	181
XVIII. MANNING AND SHIPBUILDING IN THE BRITISH AND THE FRENCH NAVIES. LETTER TO 'TIMES,' 1891	187
XIX. THE ACTUAL STRENGTH OF THE BRITISH NAVY, AND THE EXPENDITURE REQUIRED TO SECURE ITS SUPREMACY. ADDRESS TO LONDON CHAM- BER OF COMMERCE, 1889	191
XX. NAVAL CONSTRUCTION AND PERSONNEL. SPEECH, HOUSE OF LORDS, 1893	232

PART II

SHIPBUILDING

I. UNARMoured SHIPS. PAMPHLET, 1875	241
II. OUR IRONCLAD FLEET. SPEECH, HOUSE OF COMMONS, 1875	273
III. IRONCLADS AND RAMS. LETTER TO 'TIMES,' 1875	283
IV. WARSHIP CONSTRUCTION. LETTER TO 'TIMES,' 1875	288

THE FIRST VOLUME

ix

	PAGE
V. ON UNARMoured VESSELS. PAPER AT INSTITUTION OF NAVAL ARCHITECTS, 1876 . . .	298
VI. MOTION ON SHIPBUILDING. SPEECH, HOUSE OF COMMONS, 1876	305
VII. RECENT DESIGNS FOR SHIPS OF WAR. REPRINT, 'MACMILLAN'S MAGAZINE,' 1877 . . .	312
VIII. THE REPORT OF THE COMMITTEE ON THE 'INFLEXIBLE.' LETTER TO 'TIMES,' 1877 . .	333
IX. OUR NAVAL POSITION AND POLICY. PAPER AT ROYAL UNITED SERVICE INSTITUTION, 1889 .	341
X. FUTURE POLICY OF WARSHIP BUILDING. PAPER AT INSTITUTION OF NAVAL ARCHITECTS, 1891	355
INDEX	385



ADDRESSES AND SPEECHES

NAVAL AND MARITIME

PART I

ADMIRALTY ADMINISTRATION

I

RECENT NAVAL ADMINISTRATION

EXTRACTS FROM A PAMPHLET PUBLISHED IN 1872

IN the wars which have lately desolated some of the fairest regions of Central Europe, the relative naval strength of the belligerents has had little effect on the issue of campaigns. Hence there may have been a tendency to underrate the importance to our own country of her naval resources. It must, however, be borne in mind that we are an insular and not a continental people, and that no invading army can reach our shores until we have been deprived of the command of the seas. The imaginary Battle of Dorking could not have been fought unless the British fleet had been destroyed by torpedoes ; and we need only revert to the days of our grandfathers to see how the authentic events of history confirm the hypotheses of fiction. At Boulogne, in

I.

B

1805, Napoleon with an army of 200,000 men, assembled to invade, and, as he firmly believed, to conquer England, was condemned to hopeless inaction ; because Ville-neuve, after his escape from Toulon, was so closely pursued by Lord Nelson in a chase of memorable duration, and so bravely fought by Sir Robert Calder, that he was compelled to take refuge in Vigo Bay, having failed to secure, even for twenty-four hours, the command of the English Channel. A Navy is invaluable to England, not only for the defence of the country, but to protect our interests abroad. The recent abrogation of the stipulations of the Treaty of 1856, which imposed a limit on the naval development of Russia in the Black Sea, may be followed at no distant date by other demands.

As an Asiatic and a colonial power, we are deeply concerned in the fate of the Turkish Empire and its dependencies. While our fleet remains supreme on the Mediterranean, our communication with the East cannot be intercepted. Further general arguments, in support of a liberal appropriation of the national income to the maintenance of the Navy, can scarcely be required. The following pages will be devoted to an impartial criticism of our recent naval administration, and to suggestions for the improvement of the Navy.

Mr. Childers

The chequered career of Mr. Childers at the Admiralty will fill a notable page in the history of our naval administration. He will be remembered for his independence of obsolete tradition, for his unflinching devotion to public duty, for the invigorating influence of his personal example throughout the service, especially in the civil departments, and for large and, in many respects, judicious reductions effected in our former naval expenditure. The maintenance on foreign stations of numerous cruisers, ill adapted for modern warfare,

involved the country in serious expense, without adding to our influence and prestige. It is, however, alleged that, irrespective of the diminution of force, considerable economy has been obtained by the creation of the purchase department, and the adoption of commercial principles in the business transactions of the Navy. The practical result of the new system may in some degree be ascertained, by comparing the cost per man of victualling and clothing of the Navy under the most recent naval administrations :—

Comparative cost of victualling

Year	First Lord	Seamen and Marines	Vote for Victualling and Clothing	Amount per Man		
			£	£	s.	d.
1866-67	Duke of Somerset	68,400	1,235,188	18	1	2
1867-68	Mr. Corry . . .	67,300	1,241,614	18	9	0
1869-70	Mr. Childers . . .	63,300	1,172,268	18	10	4
1870-71	Mr. Childers . . .	61,000	968,857	15	17	7
1871-72	Mr. Goschen . . .	59,800	1,038,202	17	7	2

From these figures it appears that, while extravagant prices may have been paid for anchors, cables, sperm oil, and the like, the general cost of the supplies under the old régime had not largely exceeded their market value. The extravagance of former naval administrations, so severely and justly condemned by public opinion, was caused, not so much by the greater cost of dockyard in comparison with contract work, as by continual alterations of ships, while on the stocks, and by expensive and injudicious repairs.

Dockyard extravagance exaggerated

Mr. Childers was unduly precipitate in introducing organic changes in every department of the Admiralty. The uncertainty of official life may not be an excuse, though it does suggest a reason why an able and ambitious minister is sometimes tempted to undertake a

Precipitate changes

difficult task, without first sitting down and sufficiently counting the cost. The Admiralty has perhaps suffered more than any other great department of the Government from frequent ministerial changes. In 1866 the Duke of Somerset was First Lord. In the short interval of time which has since elapsed Sir John Pakington, Mr. Corry, Mr. Childers, and Mr. Goschen have in turn succeeded to an office which cannot be filled with satisfaction, either to the minister himself, to the Navy, or to the country at large, without considerable experience in its multifarious and difficult duties. Of all the statesmen included in the above enumeration, Mr. Corry alone has concentrated his powers, throughout a long and useful career, on the administration of the Navy.

Board of
Admiralty

Before Mr. Childers took office, the Board of Admiralty consisted of a First Lord, four Naval Lords, and a Civil Lord, with a Parliamentary and a Permanent Secretary. Under Mr. Childers, the Board was composed of a First Lord, a First Naval Lord, a Second Lord and Controller, a junior Naval Lord, and a Civil Lord, with a Parliamentary and a Permanent Secretary, as before. The First Naval Lord was made responsible to the First Lord for advice and action in matters relating to the fleet and the personnel of the Navy; while the Controller was in like manner responsible for the construction and matériel of the fleet. As a consequence of the changes in the Board the naval element was reduced. While two naval lordships were abolished, the Controller had a seat in their stead. When the Russian note arrived, Mr. Childers expressed his conviction that another Naval Lord should be appointed, thus clearly indicating an opinion that the reduced naval staff was insufficient to meet the pressure of war. A sea officer's career may be an indifferent education in naval archi-

ture and shipbuilding, yet naval supervision is not the less essential to naval efficiency. The United States Navy has been recently surveyed by a board of distinguished officers. Their report gives ample warning against the undue suppression of the naval element. 'Of all the vessels visited not one,' they affirm, 'no, not a single one, is effectually fit in these times to cruise at large in war, or to cope with the cruisers now possessed by the more formidable Powers of Europe.' They attribute this state of things to 'the settled indisposition, until a very recent period, to invoke the experience of the Navy.'

It was unwise to give the Controller a seat at the Board. The experience of commercial undertakings has shown the impropriety of making the responsible head of a department a member of the Board, under whose directions it is his duty to act. The administrative must be subordinate to the deliberative functions. Subordination and responsibility can no longer be preserved when the departmental officer becomes himself a member of the governing body.

Mr. Childers abandoned the old-established practice of daily consultations with the members of his Board. The necessary information on professional matters may doubtless be obtained by a civilian First Lord, without having recourse to a formal Council. In the distribution of naval patronage the advice of a Board is almost indispensable. The Navy is of necessity a scattered service. An admiral may rise to the high dignity of First Naval Lord, and know nothing of officers who have not served under his own immediate command. The united experience of a Board will secure full consideration for the claims of every individual.

Mr. Childers having been compelled to resign by ill

Mr. Goschen

health, the result of excessive devotion to his public duties, a more judicious choice of a successor could not have been made. Mr. Goschen, while ready to consider every proposal for the improvement of the Navy, has wisely preferred to retain existing systems, even when theoretically imperfect, rather than make hasty changes the value of which has not been distinctly established. He has also shown that which, in a civilian at the head of the naval service, is a great merit, a determination not to adopt *à priori* views on technical matters. On the other hand, when the exercise of authority has been necessary, Mr. Goschen has been equal to the occasion and has not been deterred from doing his duty to the country by the disagreeable nature of his task.

General organisation

In consequence of the recent changes the organisation of the Admiralty has acquired an exceptional interest. Systems are of less importance in their practical results than the abilities of those by whom they are administered. At the Admiralty, as in every department of the State, that form of government which is best administered is best. The author once recommended that the Board of Admiralty should be abolished. Further reflection has convinced him that the change would not be expedient; and it becomes a duty to himself, unimportant as it may be to the public, to retract the opinion he once too hastily expressed.

Turning now to the matériel of the Navy, the following summary may be of interest:

Including both armoured and unarmoured vessels the tonnage of the British Navy is 666,000; of the French 469,000; of the Navy of the United States 186,552 tons.

In ocean-going ironclads our fleet is superior to the united navies of the world. In vessels of moderate

draught the comparison is less satisfactory. The Admiralty have admitted the necessity of adding to the fleet of gunboats. The 'Cyclops' and three sister turret ships, drawing 15 feet 6 inches, and protected by armour of from 8 to 10 inches in thickness, are either completed or in progress. Objection has been raised to the designs both of these vessels and of the 'Devastation.' A committee, composed of men eminent in science and officers of high naval reputation, has pronounced them to be safe and stable ships. The Estimates for the current year provide for the construction of 15,512 tons of ship-ping. Of this total 3,712 tons, according to the programme laid down in the Estimates, represent the addition to the flotilla of gunboats. A question has been raised as to the value for naval warfare of small vessels which can be sunk by a single shot. The same objection could be urged against vessels of much larger size. To resist the formidable missiles of the most recently invented artillery, armour-plating is required of such weight and thickness that it could not, even if limited to the bow alone, be applied to a vessel of twice the tonnage of the 'Staunch.' An increase of tonnage may no doubt be desirable ; though even in a sea way good practice can be made by well-trained gunners from the smaller gunboats of the 'Staunch' type. It is still more satisfactory to know that some of our most recent ocean-going ironclads have elicited the highest approval of competent and impartial authorities. Captain Maccomb, of the United States frigate 'Plymouth,' who accompanied the 'Monarch' on her voyage across the Atlantic, pronounced her to be 'the most formidable and effective ironclad vessel of war for ocean service in the world.' Our earliest ironclads, the 'Warrior' and the 'Agincourt,' are the finest sea-going vessels we

possess ; but their armour is easily penetrated by modern artillery, and they are too long to be handled under sail, or to attempt, with any chance of success, to ram an enemy of more moderate dimensions.

Mr. Reed

Mr. Reed, who appreciated the disadvantage of the excessive length of the earlier ironclads, determined to try the experiment of shorter and handier ships. He believed that no loss of speed would result from reducing the length of the ships, provided that the same power in proportion to the area of the midship section were given to the shorter as to the longer ships. The event has fully justified his anticipation. In the shorter vessels, which Mr. Reed has designed, the same speed is obtained as in the longer ships. They carry more powerful guns, and the armour is infinitely heavier than in the larger ships of his predecessors.

The most serious fault of the later ironclads is their uneasiness in a sea way. This fault is the inevitable result of the attempt to give to vessels of reduced dimensions the heaviest guns and an enormous weight of armour. Only ships of the largest size could support such prodigious burdens. To increase their stability, additional ballast has been placed in the most recent ships. It would have been better to have worked up more material in their frames and plating, and thus to have combined the advantage of greater stability with additional structural strength. While Mr. Reed deserves much credit for the general excellence of his designs, it is certain that all his productions have not been equally successful.

The 'Captain'

A general review of our recent shipbuilding operations would be imperfect without some reference to the loss of the 'Captain.' The ship capsized from carrying too great a press of sail in squally and boisterous

weather. The fact that she could not be allowed to incline to an angle, which in a high freeboard ship is commonly permitted under sail, is a proof that there was grave misapprehension as to the amount of stability which she possessed. The late Controller and Chief Constructor were too well justified, as the event has proved, in pronouncing it impossible to give full sail power with safety to low freeboard ships. The blame for the loss of the 'Captain' ought in fairness to be divided among a number of individuals, and nobody can be accused of having clearly foreseen the terrible disaster which actually occurred.

The lessons to be drawn from the disaster seem to be that full sail power cannot be given to ships of the low freeboard type, and that the Admiralty should never allow the opinions of its responsible advisers to be overruled by an agitation out of doors. Public opinion on such a subject is based on imperfect information, and must therefore possess little value in comparison with professional experience.

Before the accession of Mr. Childers to office it had been too much the custom to keep our ships of war in harbour during winter. By that means no doubt ropes and sails were economised, but young officers had little opportunity of learning to handle their ships in gales of wind. By forming the flying squadron, as a school for seamanship, and by uniting the Mediterranean and the Channel squadrons, for exercise in steam evolutions, new opportunities of learning their profession have been given to naval officers. It is not necessary that the flying squadrons should always be despatched to distant seas; although the experience to be obtained in a voyage round the world must be valuable to every sailor. Frequent practice in entering and leaving port may

The
squadron

sometimes be more instructive than a long and monotonous passage across the ocean.

It is desirable that the vessels selected for commission should be capable of being handled under sail. The Americans have shown themselves perfectly ready to throw tradition to the winds, and to adopt the most novel types, to meet the changing exigencies of war. In peace they have wisely recognised the value of full-rigged ships. In his Annual Report for 1869, Mr. Robeson, the Secretary of the United States Navy, well observes that, 'lounging through the watches of a steamer, or acting as firemen and coal-heavers, will not produce in a seaman that combination of boldness, strength, and skill which characterised the American seamen of the elder day. The habitual exercise by an officer of a command the execution of which is not under his own eye, is a poor substitute for the school of observation, promptness, and command, found only on the decks of a sailing vessel.'

Mediterranean
squadron

No full-rigged ironclads should be sent to the Mediterranean in time of peace. On the line of communication between Gibraltar and the Suez Canal, to defend which in time of war would be the primary duty of our Navy, the facilities for obtaining a supply of coals are such that canvas is not absolutely essential. In the Mediterranean the winds are variable and seldom blow long with sufficient force to propel a heavy ironclad, even at the moderate speed of five knots an hour.

As a general principle, it will be admitted that where sails are not indispensable, they are an incumbrance to a ship of war which is intended to go into action under steam. It is only in mastless ships that the advantages of the turret system can be fully developed. From a purely economical point of view

mastless turret ships have much to recommend them, for they require less than half of the crew of a fully-rigged ship of equal tonnage.

The recent misfortunes of the Navy must have strengthened the convictions of those who had already disapproved of a distinct class of officers for navigating duties. It has been urged in support of the present system that a special class of officers, whose attention is confined to navigation and pilotage, will acquire a degree of proficiency in those branches of the naval profession which cannot be attained by the executive officers, who have many other duties to perform. On the other hand, it must be admitted that, as the executive officers are, under the regulations of the service, made jointly responsible with the navigating officers for the safety of their ships, we ought to give them opportunities of acquiring practice in navigation in every stage of their professional career. The executive officers who were held responsible for running the 'Agincourt' on the Pearl Rock, had probably entrusted their ships too much to the navigating officers. Nobody, who is acquainted with the rudiments of navigation, will suppose that any one of the four executive officers can have ascertained, even by laying a parallel ruler on the chart, whether the course suggested to the Admiral in command by the master of the fleet would take the ships of the inner line to a safe distance from the Pearl Rock. Yet, so long as navigation is regarded as a mystery beyond the reach of an executive officer, and this appears to be the view of those who are opposed to any change in the present system, so long the adoption of the principle of non-intervention in all that relates to navigation will be a more or less general result.

Captain Washington, the Hydrographer of the Navy,

The navigating officers

was a member of the committee of 1862, appointed to consider the position and duties of the master class. The abolition of a separate class of officers for navigating duties was strongly recommended in a memorandum, which he appended to the report of the committee. He pointed to the fact that many young lieutenants, commanders, and captains do actually navigate the smaller vessels and gunboats which they command. He urged that to entrust pilotage and navigation to masters begets indifference to those duties in lieutenants and officers of the main executive branch ; and, referring to the responsibility of the masters for steering a large ship of war in battle, he asked if it was conceivable that, when a steam ram was about to give the stem to an opponent, the captain of the ram should delegate his authority to the master at that critical moment. 'This being so, should he not,' he asks, 'have a training for handling and steering his ship promptly under any emergency ? Would he not feel far more confidence in himself had he passed through the grades of a navigating officer, and for some years had charge of the steering and conning of a ship ? Very recent events point to this mode of warfare as likely to play a prominent part in any future action. Would it be wise then to wait until the time of need, before training our young executive officers to acquire that self-reliance and confidence which can only be gained by continual practice ?'

After cruising for a short time in the Channel in a suitable vessel for instruction in navigation, executive officers would have no more difficulty in becoming proficient in navigation, than in learning gunnery on board the 'Excellent.'

It is said that the abolition of the navigating class must involve an increase in the number of lieutenants,

and that unless the number of captains be augmented, which is not desirable, the stagnation of promotion would be still more disheartening than at present. Might not this objection be met by giving inducements to officers to retire as commanders and lieutenants into the Reserve, which should be organised for the defence of the coast? The officers of the Coast Defence Reserve might receive the full pay of their rank, and ought to reside at the ports at which the men under their immediate command are enrolled. In consideration of the advantage of a settled home, and their comparatively easy duties in time of peace, they should only be eligible for promotion for services rendered during war.

Commanders and lieutenants might also find employment as representatives of mercantile houses abroad, as superintendents of packet stations, and in command of our great sailing clippers and mail steamers. When large subsidies are given for the conveyance of the mails, it is a question whether the mail service might not be performed with greater advantage to the public by the Royal Navy. The sum of 3,500,000*l.* was paid for the hire of transports during the Abyssinian expedition. The British Indian Steam Navigation Company received for the hire for nine months and eighteen days of 10,114 tons of shipping the enormous sum of 257,410*l.*, or 25*l.* 9*s.* per ton; while the Bombay and Bengal Steam Navigation Company had actually offered to sell their fleet to the Government at 27*l.* per ton.

The education of naval officers is another important and difficult subject. It is perhaps unnecessary to reiterate opinions already expressed, but it may be well to insist once more on the importance of a Naval University. For this purpose the vacant buildings at Greenwich present unrivalled advantages. There is ready access from

Naval University

Greenwich to many large engineering establishments, and to the private shipbuilding yards on the Thames. The Royal Observatory, the Gun Factories and Arsenal at Woolwich, the Dockyard at Chatham, the School of Gunnery at Shoeburyness, the lecture rooms of eminent professors in London, are close at hand, and together offer advantages not to be obtained elsewhere. The Naval University should be open to officers of the merchant service, on passing a preliminary test examination. It may not be chimerical to hope that, by offering to the mercantile marine the same education which we provide for the Navy, a bond of union will have been established between the two branches of a great profession, which both in peace and war is invaluable to England. The tone of the one will have been raised, the sympathies of the other will have been enlarged, the jealousies which have too long divided them will have disappeared, when the officers of both services participate in the advantages of a higher training than they have hitherto received, and in the responsibilities and the honours, which belong to all to whom we look for the effectual protection of our shores.

Our maritime supremacy

In consequence of the recent changes in the distribution of power in Europe, the maritime supremacy of England is now more conspicuous than at any period since the peace of 1816. We no longer observe with anxiety the naval development of France. In the United States unnecessary expenditure on warlike preparations is steadfastly resisted. The statesmen of the North German Confederation have shown no disposition to incur the enormous expense of creating a fleet which might be regarded as a rival to our own. Our naval administrators may, therefore, proceed, with ample opportunity for deliberation, to organise a force for the

defence of the coast, and to improve the reserve which we already possess for the general service of the fleet. With a good system of reserves, not only will our fleets be manned with a promptitude and efficiency not hitherto attained, but a considerable reduction will also be justified in the standing force in time of peace.

The improvement of our Navy may be to some among us a repugnant task, because associated in their contemplation with all the horrors of war ; but the English patriot will desire to maintain the naval supremacy of his country, as the only reliable guarantee, in anxious and threatening times, for the integrity of his native land, and as an instrument, in the hands of generous and far-seeing statesmen, for the preservation of peace, and the progress of civilisation.

II

DOCKYARD ADMINISTRATION

SPEECH DELIVERED IN THE HOUSE OF COMMONS, FEBRUARY 25, 1873, ON MOVING AN AMENDMENT TO MR. SEELY'S MOTION

MOTION made, and Question proposed, 'That this House, in order to remedy certain defects in the administration of the Admiralty, recommends the Government to take into consideration the propriety of administering that department by means of a Secretary of State; and further, of appointing to the offices of Controller and of Superintendent of Her Majesty's Dockyards persons who possess practical knowledge of the duties they have to discharge, and also of altering the rule which limits their tenure of office to a fixed term of years.'—(*Mr. Seely.*)

Mr. Brassey: The Motion of the hon. member for Lincoln refers to two separate departments of naval administration—namely, the organisation of the office of the Admiralty, and the management of the dockyards. The Amendment which he (Mr. Brassey) had placed on the Paper referred to the former subject only; but, inasmuch as the management of the dockyards was by far the more important and difficult problem of the two, he proposed to apply himself mainly to that branch of the subject. Good administration in dockyards could never be secured except by appointing competent men to manage them on the spot, with plenary powers to

carry out, according to their own judgment, the instructions received from the Admiralty. The managers of dockyards would be held individually responsible for failure in the performance of their duties, and should receive a liberal recognition for faithful service. Having seen how vain the attempt has been to manage the dockyards from Whitehall, he could not but turn for guidance to his father's experience, which showed that a business, almost as large and complicated as that of the Admiralty itself, could be managed with success, by the delegation of the responsibility of local administration to well selected agents. Since he had the privilege of addressing the House on this subject, the loss of the 'Megæra' had furnished another convincing proof of the entire dependence of the central office on the local officers in the dockyards. Mr. Reed, in his evidence before the 'Megæra' Commission, disavowed any intention to undertake the supervision of 750 ships from Whitehall. He said that—

'He did not consider that it had been any part of the Chief Constructor's duty to be responsible, or to see even that the master-shipwrights did their work thoroughly. A master-shipwright was the highest ship-building and repairing officer belonging to the Admiralty, and the office of the Chief Constructor and his staff was only that of adviser to the Admiralty on professional questions relating to that work. His own opinion was that, if any action were taken, which tended to weaken the responsibility of the dockyard officers, and to place the care of the ships in the Admiralty office, for every mishap that we now had in the Navy, we should have a hundred afterwards.'

The Chief
Constructor

Mr. Barnaby expressed a similar opinion. Sir Spencer Robinson took the same view—

The Admiral
Superinten-
dent

'When,' he said, 'you put a man at the top of his profession, as a master-shipwright, you put the greatest possible confidence in him ; you take such steps as you can to remind him of the importance of the work he has to perform, and any further interference would be disastrous to the best interests of the public service.'

From what class, then, are the managers to be selected ? A naval officer of the highest rank must be at the head of the dockyard, but for good workmanship and economy we must look to the professional officers of the yards. Whenever Admiral Superintendents have been before Commissions on dockyard management, they have universally declined to accept any responsibility either as to expenditure or workmanship, alleging that the professional officers were solely responsible. But if this be the case, the nominal responsibility of the Admiral for the internal economy of the dockyards, and the practice of requiring him to affix his signature to every document relating to shipbuilding, must be prejudicial to the public service. The great changes recently carried out in naval administration seem to have left this serious evil untouched. In his evidence before the 'Megara' Commission, Mr. Andrew Murray said that—

'While the Admiral or Captain-Superintendent was necessary in a dockyard as a head, he should not be concerned in its details, or in the management of the men. But, unfortunately,' he said, 'it is the case with the rules now—and they seem to be attempting to go further in that direction—that they take the power out of the hands of the principal departmental officers.'

Mr. Reed urged very strongly a similar criticism—

'The shipbuilding officers in the Admiralty have not,' he said, 'any power of controlling a dockyard, and if

the result of this inquiry should be to establish an arrangement by which they should be authorised and enabled to look after the ships, I would consider it to be a very happy result.'

But there has been no such position given to the professional staff of the Admiralty, and I believe, under the latest improvements, there have been no changes in that respect. There ought to be an organisation by which there should be a professional officer in each dockyard, and a professional officer at the Admiralty, who should be looked to for the exercise of that responsibility, and who should have the means of exercising it. Mr. Reed further expressed an opinion that—

'The naval officer should be consulted on all parts of the ship which relate to his professional work, but the want of a definition of the shipbuilder's duties, and of the naval officer's duties, worked very great mischief, and a great change in that respect was necessary.'

In a dockyard the Superintendent must always be required, as the local representative of the Admiralty; and his experience afloat—the more recent that experience the better—would enable him to exercise a most beneficial supervision over the equipment of the ships. But these duties were entirely distinct from those involved in the internal management of the yard. Having showed that we want the best shipbuilders in the country as managers of dockyards, we had now to consider what steps should be taken to induce the most qualified men to enter the public service. The pay should be gradually raised. The present salaries were entirely inadequate, when compared with the importance of the duties, or the corresponding salaries in the employ of private firms. Owing to the insufficiency of the salaries, we were continually losing some of the most

Civil officers

valuable subordinate shipbuilding officers in the dockyards. The surveyors at Lloyds were almost all obtained from the dockyards. But large salaries were not the only means of making the employment attractive. The relative rank of the professional officer should be considered. The civil manager of each dockyard should have adequate relative rank. He could not see why he should not rank with, but after, a rear-admiral, or, at any rate, with, but after, a post-captain. Again, honorary distinctions had never of late been bestowed, though it was clear that meritorious services in the dockyards gave as good claim to the Order of the Bath as the work in any department of the Civil Service of the Crown. The same neglect of our great naval shipbuilders was not manifested in former days, when Sir William Seppings and Sir William Rule were distinguished—and very properly so—by some mark of the favour of their Sovereign. That men of so much ability as some of the present master-shipwrights should be induced to remain where they are, only shows how easily the Government might make such employment attractive. The professional officers should not be promoted workmen. Men promoted from the ranks often show that melancholy dread of responsibility which was so painfully exhibited in the 'Megæra' inquiry. Sir Spencer Robinson gave a strong opinion on this subject when he said that—

'Knowing the timidity and the sort of want of straightforwardness which belong to the class from which many of those officials were sprung, he considered that, being aware that they had committed an oversight, the whole of their evidence was untrustworthy.'

Sometimes the most suitable officer might be appointed from a private establishment, but as a general rule

he would be found among the subordinates trained in the service. Occasionally a naval officer might have had an opportunity of showing a special fitness for the post. Having made a happy choice of a fit person, it remained to consider what modifications might be desirable in the duties of the appointment. The correspondence should be materially reduced. Sir W. Edmondstone told the 'Megara' Commissioners that the master-shipwright was more occupied in office work than in the practical part of his duty; and that he was completely dependent on the assistant master-shipwright and the foremen. The most elaborate returns, do what you will, afford no security for economy. Immediate skilful personal supervision over the labour employed and the conversion of materials can alone secure economical administration. Every master-shipwright should be relieved of the duty of appending his signature to documents which he signs as a mere matter of form. A highly qualified confidential secretary should be assigned to every master-shipwright, who should be authorised to deal with all matters of office routine. When a ship was to be built or repaired in the dockyard, the master-shipwright should be required to make a careful examination of the work, and prepare his own estimate. If this estimate were approved, and the work ordered, his name should be inserted in the Naval Estimates, in a separate column, opposite the figures for which he was responsible. This practice would tend materially to create a sense of individual responsibility, which would never be felt by officials who were allowed to screen themselves from criticism behind the nominal authority of the Controller or Admiral Superintendent. The various suggestions which had been proposed could not be adopted, unless the Admiralty felt justified in placing

Too much
office work

Promotion
of workmen

implicit reliance on their staff. Personal confidence between principal and agent could only be established after many years of careful training and thorough trial in subordinate positions. The head of a private business had the means of putting his agents to such a test ; but in the public service, under a Parliamentary system, where political and personal considerations caused frequent changes, the same opportunity of long continued observation of the conduct of subordinates was rarely given to a Minister at the head of a Department. At the same time he was convinced that the more we decentralised, the more vigorous and economical our dockyard administration would be. Among the illustrations which might be adduced to show the evil effects of excessive concentration of authority at the Admiralty none could be more striking than the present arrangement for the promotion of workmen. The events which were daily occurring around us showed the difficulty of managing large bands of workmen. The professional officers were responsible for workmanship and economy in dockyards, and yet the artisans employed under their directions were placed under the Admiralty Superintendent for the regulation of discipline, while their promotion depended on the will, or at least on the approval, of the Controller in London. The Controller could have no knowledge of the individual merits of the workmen, but his nominal intervention deprived the local officers of their legitimate authority over the men. It was because the central authority had no other means of testing the capabilities of the workmen that recourse had been had to the plan of applying a literary test to artisans who were candidates for promotion. The qualifications required were manual skill and diligence ; but inasmuch as the central authority would not trust

the local officers, the aspirant workman was tested by examination papers, although it must often happen that the most skilful artisan with the pen was the least skilled in the use of the adze and the saw. With regard to the tenure of office of the Superintendent, who was a temporary, and of the master-shipwright, who was a permanent officer, if the latter were raised to the position of manager of the yard, there seemed no reason why the present rules as to the appointment of Admiral Superintendent should be changed. Before finally quitting the subject of dockyard economy, he would urge the importance of avoiding spasmodic and violent alterations in the shipbuilding programme. The right hon. Member for Pontefract had very wisely laid down a scheme for the production of a given quantity of armoured and unarmoured ships each year. The number of workmen, the supply of materials, the arrangement of the machinery must be regulated with reference to the amount of work proposed. As regards the armoured ships, our policy must mainly depend on the preparations of other Powers. The condition of foreign navies was accurately known, and no important changes could be effected suddenly, or without our knowledge. The unarmoured ships could be rapidly produced whenever required, both in public and private yards. A large staff of workmen would not therefore appear to be necessary for the sole purpose of building vessels of that class, though enough must always be retained to undertake repairs of the fleet. Encouragement was much wanted both for workmen and sub-officers—such as foremen. A percentage on profits, where there were none, could not be offered; neither could a percentage on savings be proposed without the risk of important work being scamped. But a distribution of gratuities to deserving

Building
policy

workmen, on the satisfactory completion of any difficult work, might be a valuable stimulus to exertion.

The Admiralty Board

He would now say a few words on the government of the Navy by a Board. He had on a former occasion supported without reserve a Motion very similar to that now introduced. Further consideration had induced him to withdraw from his former position. The inquiry held before the Duke of Somerset's Commission, and the strongly expressed opinions of Sir John Hay, Sir Frederick Grey, Sir Alexander Milne, and Sir Sydney Dacres, had convinced him that he was ill-advised in advocating the dissolution of the Board. When the First Lord was—as it usually happens—a civilian, it must be right that he should have an opportunity of hearing more than one opinion on a controverted naval question. It must also be well that all the members of the Board should have a general knowledge of the proceedings of the Admiralty. Again, in matters of patronage it must be undesirable that a Minister should be entirely dependent on a single adviser. The Navy was a scattered service. Only a certain number of officers could ever have served under the personal observation of one individual, and it must be impossible for an Admiral to place the same confidence in officers he has never seen in service, which he feels in those who have been under his own command. Hence an inevitable tendency to a select band of followers. The presence of other officers at the Council table of the First Lord would secure fair consideration for the claims of those who were not personally known to the First Sea Lord. It did not follow that the advice of the Board should impair the authority of the First Lord. In commercial life many boards were governed by the chairman with autocratic power. How much more easy must it be to secure a similar supremacy at the Admiralty.

rality, where the authority of the First Lord was effectually protected, both by usage and by the influence due to those personal qualifications, without which he would not have been selected to fill such an important post. The charms, too, of antiquity are universally recognised in an ancient country ; and if by wisdom in practice all that is objectionable in point of form could be effectually remedied, it would not be wise to make a change on theoretical grounds. At the Admiralty—as in other departments of the Government—

That which was best administered was best.

The hon. gentleman concluded by moving the Amendment of which he had given Notice.

Amendment proposed.

To leave out the words 'Secretary of State,' in order to insert the words 'A Board of Admiralty with such modifications of constitution and procedure as experience has shown to be desirable.'—(*Mr. Brassey.*)

III

NAVAL EXPENDITURE, ETC.

SPEECH DELIVERED IN THE HOUSE OF COMMONS,
APRIL 30, 1874

MR. BRASSEY protested against a fluctuating and undecided policy as to our naval expenditure. The efficiency of the British Navy ought never to become the battle-field of political partisans. He hoped Parliament and the country would pronounce a definite opinion, obligatory on successive naval administrations, at least until the relative positions of the British and foreign Navies were materially altered. All that was required might, he believed, be accomplished with an average expenditure of 10,000,000*l*. In some years, with an exceptional proportion of repairing, an addition to that average might be required. The average yearly expenditure for the ten years previous to 1869 was 11,587,041*l*., and for the next five years 9,785,915*l*. A slight addition to the average expenditure of the late Administration, which might, perhaps, have allowed barely enough for repairs for ironclads and the construction of a sufficient number of unarmoured vessels to relieve those now in commission, would keep us well ahead of every conceivable combination of Powers which could be formed against us. Economy would never be secured unless naval expenditure could be sustained upon an equitable scale. In 1865, when shipwrights in London were earning from 6*s*. 6*d*. to 7*s*. a day, those in Sheerness yard,

Wages in
dockyard:

men at least equally skilled, were contented with 4s. 6d., preferring more moderate wages with a certainty of employment to higher wages without such certainty. Hasty dismissals of workmen from the dockyards should be avoided as tending to impair the confidence of permanency. It did not follow that the reduction of the numbers of established men was impolitic. With a large number of these men the dockyards might be encumbered with many useless people, against whom no definite charges could be made, and who could not, therefore, be got rid of. The idea had until lately too widely prevailed that dockyard administration was a synonym for extravagance. He believed it was in some respects superior in quality, and approximately equal in cost, to the work done in the private trade. No private employer could obtain as good workmen as the Government for the wages paid in the dockyards; and among the salaried officers, many would be found who could obtain three times as much pay in the private trade. He would now inquire whether there had been anything either in the construction or the mode of using the boilers of our ironclads which had led to their premature deterioration. From the recent return it appeared that the 'Minotaur,' completed in 1867, and the 'Valiant' in 1868, were now receiving new boilers, and that the 'Bellerophon,' completed in 1866, had had new boilers in 1870. In these cases the duration of the boilers was decidedly inferior to the results obtained in the merchant service. By the kindness of Mr. Burns, one of the owners of the Cunard line, he was enabled to state the results obtained in two steamers belonging to that company. The steamship 'Russia' left Liverpool on her first voyage in May, 1867, and in November, 1872, completed her 53rd voyage to and from New York. In

Boilers

this service she had run 328,600 knots, and was then laid up for repairs. The boilers were lifted and re-tubed and the bottoms renewed. A new steam chest and funnel were added, and the engines were put in thorough working order, the whole being effected at a total cost of 16,444*l*. The 'Scotia' left Liverpool on her first voyage to New York in May, 1862, and commenced her 78th trip in April, 1874, having in the interval run a distance of 483,600 knots. Her boilers had been re-tubed, but never removed in any way. He questioned if any such result had as yet been accomplished in a man-of-war. Again, he entertained some doubts as to whether the boilers of the ships in reserve were as carefully preserved as they ought to be. It was the practice, he believed, until a recent period, to get up steam at least once a year in every ship in the Steam Reserve. He was informed that such a plan was most detrimental to the boilers.

Engine-
room staff

It remained to be considered whether the appointment and professional instruction of the Engineers of the Navy left anything to be desired. It seemed to him that too many highly educated men were employed in the engine-rooms of our men-of-war. Skilled mechanics would perform the duties as well or better, and they would not feel the social disadvantages of the junior grades of engineer officers, nor the same discontent at the want of promotion. This change had recently been made, and with satisfactory results, in the United States Navy. In our Navy the pay of the highest grade of engineer officers was on a liberal scale. The subordinate grades were most inadequately paid. Engine-room artificers had become more and more essential on board ships fitted with the complicated appliances introduced into the later ironclads. They ought to be operative

mechanics of the highest class. The pay of 5*s.* a day was utterly insufficient to induce the best qualified artisans to serve in the fleet. The system of introducing into the Navy engineers from the private engine-building establishments had ceased. All our engineer officers were now trained by the Government, and it was a question whether that training was in all cases as practical as it ought to be. He should be glad to see the opportunity still given to the sons of *employés* in the dockyards to become engineers in the Navy. A certain proportion of the appointments should be given to individuals coming with satisfactory recommendations from the great engine-makers.

IV

OUR NAVAL STRENGTH AND POLICY

REPRINTED, BY PERMISSION, FROM THE 'CONTEMPORARY
REVIEW,' APRIL, 1876

PUBLIC attention has lately been directed to the relative strength of our own and foreign navies. With the true and natural instincts of an insular people, the momentous importance of the subject has been universally recognised. The mere enumeration of the armoured fleets built and building for foreign nations has given rise to a certain uneasiness, which, however, the facts of the case do not justify, and which it is therefore very desirable to allay.

Our exact position can be best ascertained by referring to the most competent observers in other countries. It is not less difficult for nations than for private individuals to form a just judgment of themselves. We do not look for impartiality in the mutual criticisms of contending politicians, neither can we rely on the popular impressions of the day, in making a comparison of the armed strength of nations. A sound opinion on questions so momentous and difficult can only be formed by a few professional men, who are acquainted with all the facts, and can examine the situation without national bias or prejudice. It may not, therefore, be inopportune, at a time of active controversy on naval subjects, to furnish to the British public the means of estimating the relative strength of the navy, upon evidence derived from an independent and impartial source.

It is only in those countries where the Government is directly responsible to a popular assembly that the administrative departments are allowed to make an unreserved statement of the exact condition of the naval and military forces, or to comment freely, in speeches and published reports, on the resources of other powers. There is no reserve on these subjects in England, and none in the United States. It is from America, therefore, that we shall endeavour to obtain a reliable view of the condition of the British navy. Here it may not be superfluous to explain that the state of the United States navy is not, as with us, reviewed annually in a long speech by the secretary at the head of the department. The subject is more satisfactorily treated in a report addressed to the President, to which are appended separate reports from the head of each branch of the naval service, together with a general report, to which we propose more particularly to refer, from the admiral occupying for the time being the position of chief naval adviser to the department. That important post has been held for many years by Admiral Porter, an officer of the highest distinction in the American navy. In his successive annual statements, Admiral Porter has more than once referred to the condition of the British navy. We shall proceed to quote from his observations.

American
opinion

In 1871 Admiral Porter thus expressed his opinion of our shipbuilding policy, and his appreciation of our success in its practical development :

Admiral
Porter

‘The fleet of Great Britain is most formidable. Never in the history of England was she better prepared for war than at the present moment, in ships, material, officers, and men, as I know to be the case from actual inspection of her vessels of war by our most intelligent officers. The introduction into our navy of the monitor

system was the death-knell of the great wooden fleets of Europe. England in particular suffered by the change ; but, nothing dismayed, the Board of Admiralty went to work and devised plan after plan, until the British fleets now boast the finest equipped iron ships in existence, capable of contending with the combined navies of Europe. To suppose that this Board of Admiralty, so unjustly criticised, have not made mistakes, would be out of the question ; but their errors are comparatively few, and have, in most instances, been rectified. A want of stability in the ironclads was one defect, which has been cured by putting more weight in the bottoms of the ships ; but in this, as in other subjects at issue, there has been an amount of professional skill brought to bear that has carried the Board of Admiralty through most triumphantly.'

Mr. King's
report

It is a notable fact that this report was made immediately after the return of Mr. King, the head of the Bureau of Steam Engineering of the United States Navy, from an official tour abroad. That officer had been directed in 1870 to proceed to Europe, and to make observations on the machinery and appliances of the most important public dockyards and private establishments. His mission had been fulfilled with ability, and the report of his proceedings had supplied the Government with minute information as to the condition of every navy, and the internal economy of the dockyards of all the maritime powers. It is highly satisfactory to learn from a competent authority that we possess, in our private shipbuilding establishments, unrivalled resources for the rapid and economical execution of every kind of work, whether for naval or commercial purposes.

Mr. King refers to the British Admiralty as—

'Charged with the administration of by far the

largest and most powerful navy in the world ; always most careful in the application of new inventions ; rarely adopting any untried plans, but surely accepting those most successful in practical operation.'

In 1874 Admiral Porter again refers to the British navy, and in the same eulogistic terms as before.

Admiral
Porter's
opinion of
British
Navy

'Who,' he says, 'can interfere with British commerce, or maltreat a British subject in any part of the world without paying damages ? The combined navies of Europe could not approach the English coast with safety.'

In another passage he says :

'The West Indian drill has made it apparent to our officers that our combined force of vessels was incapable of a successful encounter with a fleet a quarter as large, built on modern principles. Indeed, one such ship as the British "Invincible" ought to go through a fleet like ours, and put the vessels *hors de combat* in a short time. We have no ordnance that would make an impression on such a ship at a distance of 600 yards, and no vessel of equal speed in our navy could be placed under her fire by a prudent commander.'

The reassuring testimony from Admiral Porter will be confirmed upon a comparison of the numerical strength of the armoured fleets of the principal maritime powers. A certain thickness of plate will be assumed as essential in order to justify us in including a ship in the category of armoured vessels. M. Dislère has laid it down that armour of less than seven inches in thickness cannot be regarded as a protection against modern artillery. Without entering into discussion on the soundness of this opinion, we have accepted it in the present instance, for the purpose of making a comparative estimate of the strength of the most powerful maritime nations of Europe in first-class ironclads.

French construction

Excluding gun-vessels, France possesses a fleet of twenty-six ironclad ships ; but of these twenty-two are built of wood, and five only are armoured with plating exceeding seven inches in thickness. There are in construction in the French naval yards the 'Redoutable,' of 8,500 tons and 1,500 horse-power ; two ships of the 'Colbert' type, the 'Friedland' and the 'Suffren' of 8,164 tons ; three ships, the 'Galissonnière,' the 'Triomphante,' and the 'Victorieuse,' having a displacement of 3,445 tons, of 500 horse-power, and armed with ten guns ; and lastly, the 'Tempête,' of 4,452 tons and 375 horse-power, and the 'Tonnerre,' of 5,425 tons and 900 horse-power. The future strength of the French armoured navy was defined in a programme laid down in the year 1872, when it was determined to build seven ironclads of the first class, five of the second, and eight coast defence vessels. Of the first class five ships are built and three are building ; of the second class there are three ships building ; and of the coast defence class two ships are building and four are built. It was proposed that the programme should be completed within ten years, but for this purpose an annual expenditure of 30,000,000 francs was required. The estimates, however, for the French navy have been much reduced ; and the appropriation for the construction of ironclad ships has thus far been limited to an annual sum of 20,000,000 francs.

Germany

In 1873 a programme was laid down for the construction of the armoured fleet of the German navy. The plan included the construction of eight first-class ironclads, to be protected by armour exceeding seven inches in thickness. All these ships are completed. Six corvettes were proposed which were to be plated with six-inch armour only. One vessel of this class, the

'Hansa,' is now in commission, and two other corvettes of the same type are building. Seven monitors were included in the programme. Two of these have been built ; the construction of the remaining five vessels having been abandoned, the German Admiralty being now of opinion that the harbours on the coast can be more effectually defended by means of torpedoes and gun-boats. Lastly, it was intended to build two armoured batteries ; but these have likewise been abandoned.

The Russian navy possesses twenty-nine armoured vessels. In this number, however, are included fourteen monitors intended solely for coast defence, of from 1,600 to 1,400 tons, and plated with $4\frac{1}{2}$ inch armour. Only two sea-going vessels, protected by armour exceeding seven inches in thickness, have been completed. The 'Peter the Great,' which has been so much discussed, though launched in 1872, still remains unfinished.

It will be seen from the above statement that if we make a comparison of the British armoured navy with the fleets of France, Germany, and Russia, we possess in our seventeen ships, all built of iron, none plated with armour of less than seven inches in thickness, and some defended by a cuirass composed of armour of from sixteen to twenty-four inches, as in the case of the 'Inflexible,' and from fourteen to sixteen inches, as in the case of the 'Dreadnought,' 'Thunderer,' and 'Devastation,' a fleet at least equal, if not superior, to those of the three powers united.

Passing from a review of our present situation to a consideration of our future shipbuilding policy, it will be the duty of our statesmen to take care that, while adequate provision is made for the security of the country, we do not exceed the scale of expenditure which is strictly necessary. Let us not, without grave necessity, arouse the susceptibilities of other nations. Reckless

Russia

Future
ship-
building
policy

additions to our naval estimates lead to corresponding expenditure elsewhere. We lay heavy burdens on the taxpayers of this country ; we check the accumulation of those resources which can alone supply the means of enduring the strain of a protracted naval war ; and the relative strength remains unchanged.

France and
United
States

It is equally clear that the composition of the fleets we may have to encounter, and the nature of the naval operations which would probably be directed against us, must be taken into consideration in determining what type we ought to adopt in the future for our fighting vessels. France and the United States are our most serious naval rivals. In actual preparation, both of *personnel* and *matériel*, and in the scale of their annual expenditure, the French are far ahead of any other maritime Power. On the other hand, by their capability for building and manning a fleet, by their inexhaustible capacity for bearing taxation, by their unrivalled ingenuity, by the number and skill of their seafaring population, and by the absolute security of their principal harbours from attack by sea, the United States, although at present the least prepared of all the powers of the first rank, would, in any long protracted naval war, unquestionably become the most formidable adversary with whom we could have to contend. There is happily little probability that the problem will be solved by actual experience in war. The question is only raised in these pages as a subject for abstract discussion. Thus regarded, however, it is interesting, and indeed essential, to know what is in the contemplation of the two most important maritime Powers. Their views have been clearly indicated in recent publications by very eminent authorities. For the United States we shall refer to Admiral Porter. The current

opinion of the French navy has been recently and very fully stated both by M. Dislère and by Baron Grivel, a distinguished naval officer, in his essay entitled 'De la Guerre maritime.'

In both countries it is admitted that pitched battles on the ocean could not be fought with success against a nation possessing the unassailable superiority we have acquired in sea-going armoured ships.

In his annual report for 1875, Admiral Porter says :

'It is only by destroying the commerce of a great nation that we could bring her to terms. Hence, iron vessels like the "Alabama," roaming over the ocean, sinking and destroying, would do more to bring about peace than a dozen unwieldy ironclads, cruising in search of an enemy of like character.'

Admiral
Porter
on com-
merce de-
struction

For this reason, he recommends for the American navy a fleet of swift wooden cruisers, of at least 1,200 tons, with the heaviest batteries, and a speed of not less than fourteen knots.

The same policy has been advocated by M. Dislère, and by Baron Grivel. The views of these able writers are identical, and they both refer to the naval history of their country for evidence and illustration. Baron Grivel truly says that the problem every nation has to solve may be stated thus : 'Given, a naval expenditure of so many millions a year, in what proportion shall our naval preparation be applied :

Baron
Grive

'1st. To coast defence ;

'2nd. To the protection of commerce ;

'3rd. To ships intended to engage in great combats in line of battle ?'

With a view to the elucidation of this subject, the naval history of France is reviewed in an able summary. It is argued that no naval battle has ever produced the

Commerce
attack
the best
policy

Injury to
trade more
effectual
than big
actions

same decisive results which have so often followed from victories gained on land, or has brought about in the same way the immediate conclusion of a treaty of peace. The fruitless efforts and cruel sacrifices of the naval forces of France are insisted upon, as an objection to the policy of engaging in those contests between fleets of line-of-battle ships, which in former times were so persistently renewed, and which were as advantageous to England as they were 'detestable in their results to her enemies.' It is recommended that, whenever France may be engaged in war with a great maritime nation, she should look to the exhaustion of her opponent through the injuries inflicted on trade and industry as the most effectual, and indeed the only means of bringing her to terms. It is alleged that England is five times stronger in shipping than France; a superiority naturally arising from the circumstance that the one is an insular and the other more than half a continental power. With such immensely superior resources, it is easy, it is alleged, to foresee the inevitable result of a series of naval battles. 'The minister who, with wise discernment, shall have selected the fitting time and opportunity for employing the naval forces of France, and shall have been able to reach the weak point of the enemy with comparatively limited naval means will,' in the opinion of Baron Grivel, 'have rendered a greater service to France than Colbert and Richelieu.' It is indeed demonstrated in the page of history that the glory won by the great naval armaments of France is small by comparison with the brilliant achievements of the expeditions conducted on a less ambitious scale. Between February 1, 1793, and December 31, 1795, the French took 2,095 merchantmen, while, within the same period, their own losses did not exceed 319 vessels.

'If the genius of Napoleon, who once wrote to Bernadotte, "I have a hundred ships of the line, and yet I have not a navy," had employed an equal sum of money in the construction of swift and well-armed vessels of much smaller dimensions, a guerilla warfare might have been carried on upon every sea, which would have brought him ample compensation. A comparison of the vulnerable surface presented by the maritime commerce of Great Britain and France respectively will suffice to show where the one has most to lose and the other most to gain.'

Another able French writer, Admiral Jurien de la Gravière, in his able essay, '*La Marine d'aujourd'hui*,' while viewing with evident reluctance the necessity for abandoning the attempt to maintain the supremacy of the sea, admits, nevertheless, that the destruction of the enemy's commerce may be the last resource of the weaker side; and such a policy, he acknowledges, it would be necessary to pursue, should France ever be called upon to engage in a naval contest with England.

Admiral
Jurien de
la Gravière

The views thus developed by the most thoughtful men in the French navy must convince our own naval administrators that, in the event of war, our commerce would be assailed by as many 'Alabamas' as our enemies could equip and send forth against us. Our unrivalled superiority in ocean-going steamers adapted for conversion into cruisers would, however, go far to compensate for our greater vulnerability.

As an additional security, I should be glad to see added to our navy numerous vessels, with sufficient armour-protection to give them a great advantage in an encounter with unarmoured vessels, although not adapted to contend on equal terms with enormous ships of the 'Inflexible' type. For the protection

Armoured
cruisers

of commerce, an equal sum would be spent to greater advantage in building ships of the 'Shannon' class, two or three of which can be built for the amount expended on one 'Inflexible.' For an encounter with an 'Alabama,' the 'Shannon' is a superfluously powerful antagonist. If, however, we could send forth a sufficient number of 'Shannons' to cruise at sea for the protection of commerce, the dread of an encounter with an armoured vessel, from which there would be no possibility of escape, might have the effect of deterring the enemy's 'Alabamas' from venturing to sea.

Foreign
policy of
construc-
tion

It has been shown that we have no reason to expect that other maritime powers will expend a large proportion of their comparatively limited resources on costly ironclads of the 'Inflexible' type. In point of fact, we know that neither the Americans, the Russians, nor the Germans contemplate at present any addition to their fleets of armoured ocean-going ships of high freeboard. The Americans are building no new ironclads of any description. The efforts of the Russians are concentrated in the construction of one or two 'Popoffkas.' The Germans, content with eight splendid ships, have decided to build no more first-class ironclads at present. The French have a few fine ships in construction. The work is being carried on with a deliberation which shows that serious doubts are entertained as to the expediency of building any ships of so large a type.

Battle-ships
necessary

Under these circumstances, what course should be adopted by the British Admiralty? With our immense maritime interests we cannot afford to sit still like other powers who do not depend for their existence on their commerce. Laying it down, therefore, as an absolute rule, that our present scale of expenditure shall not

be exceeded, unless and until the naval expenditure of other powers shall unhappily have been considerably augmented, the question we have to consider is, how best to apply the ample resources placed at the disposal of the Admiralty by a confiding and generous Parliament. This is essentially a naval question ; but even unprofessional minds must be convinced, upon an impartial review of the publicly expressed opinions of the most competent authorities, that the gun, the ram, and the torpedo are indispensable elements of the English naval force ; and that the advantages of armour in an engagement between an armoured and an unarmoured vessel are such that we must continue for the present the construction of ironclad ships.

The most recent changes in naval warfare have tended to augment the relative power of offensive weapons as compared with the means of defence. Although, therefore, we cannot venture as yet to abandon armour altogether, it seems more important to strengthen the fleet in weapons formidable for attack, than to accumulate armour, which, as a means of defence, is of more doubtful value. The fleet which has a decided superiority in numbers and in the power of its guns, its rams, and torpedoes, cannot fail to inflict many irresistible blows, while possessing in the wide distribution of its force perhaps the best security that can be obtained against similar weapons in the hands of an enemy.

Relative
power of
attack and
defence

Admiral Porter has graphically described how, 'when the battle commences and the ships are enveloped in smoke, rams and torpedoes will have pretty much their own way ; and the more smoke there is, the better it will be for them.' The ships of the 'Minotaur' class have been criticised for their insufficient armour and their

excessive length. They would become most formidable if they were supplied with torpedo boats, which they could carry in larger numbers than it would be possible to stow in a shorter vessel.

Rams

The concurrence of naval opinion in favour of steam rams is remarkable. The ram becomes increasingly formidable in proportion to its mobility or handiness. The smaller the tonnage the more easily a vessel can be manœuvred. It is clearly desirable to limit as closely as possible the tonnage of all ships intended to be used as rams. Both Baron Grivel and M. Dislère have recommended that for purely harbour defence rams should be built without guns.

'They themselves,' said Admiral Goldsborough, 'should be the projectile, and the steam the gunpowder ; and the effect of both, properly directed, would be irresistible. Guns would be detrimental to unity of purpose, and to fit a ram for guns would swell the item of cost largely, and thus abridge their multiplication.'

A remark by Admiral Persano, in his memorandum on the battle of Lissa, would seem to imply that he too shared the same views.

'As encounters between ironclads will,' he said, 'be decided rather by the ram than by the fire of artillery, that fleet would undoubtedly win the battle which had the greatest number of ships fitted with double screws.'

Vessels of this class should be included in the next programme of shipbuilding.

Value of
monitors

In ships intended for a wider field of operations guns are indispensable. When we take into view the evident difficulty of ramming an enemy in the side at right angles, and the number of blows which would probably

be struck without result, it is evident that there would be ample opportunity in a naval engagement for the effective employment of artillery. For bombardments, and for operations against the coasts and harbours of an enemy, guns are indispensable. It was on this ground that Mr. Reed especially insisted, in a recent speech in the House of Commons, that the construction of ironclads should be prosecuted with undiminished activity. As, however, a moderate draught is essential for operations on a coast, ships of the 'Inflexible' type are not available for such a service. No officers have had so much experience in naval operations against batteries as the Americans who served in the Civil War; and Admiral Porter has stated in his report for 1875 that, after examining over a hundred plans of foreign ironclads, he thought he was justified in the conclusion that a vessel like the 'Miantonomoh' was better adapted for protecting coasts and harbours, and for engaging land batteries, than any ship yet built. General von Stosch has decided on abandoning the construction of monitors for the defence of the German harbours, believing that gunboats and torpedoes will be sufficient for that purpose. Torpedoes, however, are not available for offensive operations against land batteries; and should we find ourselves engaged in the shallow waters of the Baltic or the north coasts of Europe, a flotilla of monitors would probably be of great value. The Russians possess fourteen monitors, while we have only four vessels of the 'Gorgon' type.

American
experience

It may be urged that the smaller the dimensions the more quickly a vessel can be built, and that it is less important, therefore, to proceed with monitors than with ships of a larger class. But even monitors could not be laid down and completed within the short space of time in which modern conflicts have been decided.

Best type
for line of
battle

We have now to consider the best type for the line of battle. Offensive weapons have gained a complete ascendancy over the means of defence. Armour no longer affords an impenetrable target to projectiles, and gives no protection against the ram and the torpedo. Armour, of sufficient thickness to be a shield against the fire of the guns now extensively mounted on board ship, must be so weighty that it is impossible to protect the high sides of ocean-going vessels. We must be content if we can give protection to the water-line and to the engines and boilers.

French
view

Prince de
Joinville

In the great uncertainty which envelopes the future of naval construction, the Admiralty are clearly right in completing the armoured vessels already commenced, before undertaking new designs. In a paper published by Prince de Joinville in the '*Revue des Deux Mondes*' in 1867, and republished with additions in 1871, he endeavours to show, from the experience derived from the American Civil War, that in all international struggles the relative strength of the naval forces of the contending powers must exercise an important influence on the issue of the conflict. He thinks that the fleet must be strong enough, not merely to commit depredations on commerce, but to maintain the command of the seas. The naval policy recommended for France by Prince de Joinville is inspired by ambitious aims. He does not advise that the construction of armoured ships should be prosecuted too rapidly, or that many vessels should be laid down simultaneously.

'Such rapid progress is being made in these days in inventions, and in their application and perfection, that what seemed the last word of science yesterday is out of date to-day. If, therefore, too many ships of a uniform type are laid down at the same time, a risk is

incurred of building at a great cost vessels which may be condemned as useless before they can be completed for service.'

Whatever may be the type adopted, we trust that for the future our naval constructors may be directed by their parliamentary superiors to confine themselves within the limits of tonnage laid down by Admirals Elliott and Ryder, who, in their separate reports, as members of the Admiralty Committee on recent designs for ships of war, expressed their conviction that distribution rather than concentration of force should be the aim of the naval architect, and that a tonnage of 9,000 tons should not be exceeded.

Types of
the future

To sum up our various suggestions for the future shipbuilding policy of the navy. The construction of first-class armoured ships should not be discontinued. Whatever may be the final issue of the contest between armour and projectiles, armour is still essential to enable a ship of war to engage in line of battle. While the construction of ships of the most formidable type is still carried on, we invite the attention of the Admiralty to the strong recommendations by officers of foreign navies in favour of rams without guns for general service, and specially for defence of harbours, and to the high estimate formed by the American officers of the monitor type for the purpose of attacking land batteries.

British
policy

It affords us much satisfaction to acknowledge that, when we pass in review the most recent phases, the shipbuilding policy of the British nation must be pronounced on the whole eminently successful. The gradual development of our power, in a succession of original designs, embracing every kind of innovation upon the types in vogue fifteen years ago, reflects the highest credit on the naval and professional officers by whom the shipbuilding

programme of the Admiralty has been advised and executed.

The course of recent events abroad, and the development of our varied and still increasing industrial resources at home, have made the naval power of England relatively greater than at any period since the close of the long conflict with Napoleon. May the strength we now possess be ever used to maintain justice, to establish peace, and to diffuse civilisation to the furthest limits of the seas!

V

NAVAL SHIPBUILDING

SPEECH IN THE HOUSE OF COMMONS, MARCH 11, 1878, ON
MOTION FOR COMMITTEE OF INQUIRY ON NAVAL SHIP-
BUILDING

MR. T. BRASSEY said that in seconding the motion of the hon. member for Lincoln he wished to explain that, while he gave his hearty support to his proposal, he saw no cause for general dissatisfaction with our navy. The zeal and ability displayed throughout the recent crisis of preparation for war in the fleet, at the Admiralty, and the dockyards, had been such as to disarm criticism. But though he gladly acknowledged that we possessed a fleet in which the country might justly take pride, he confidently believed that a searching Parliamentary inquiry at the present juncture would be of great assistance in framing a policy for the shipbuilding of the immediate future. He need not enter on a long review of our past naval history in order to show that such an inquiry was desirable. Our later ships, though admirable examples of naval architecture in their several types, were almost exclusively adapted for ocean warfare. No one would complain that we had too many first-class ships, but we had no inshore squadron worthy of the name. We were conspicuously deficient in ships adapted for attacks on forts and batteries. We had been warned of our shortcomings in this respect by Sir Thomas Symonds and other eminent officers, but we had neglected their advice.

Cost and
dimensions

'Devastation' and
'Dreadnought'

All our recent ships had been of the largest dimensions, and as an inevitable consequence, the additions to the fleet had been lamentably few. In the five years ending March 31, 1879, only seven ironclads would have been added to the navy, and of those five only would have been built in Her Majesty's dockyards. The cost of our ironclads had advanced in proportion to their tonnage, and the 'Inflexible' was estimated to cost 460,000*l*. It seemed a strange fatality that the design for our largest and costliest ship should have given rise to a controversy of unprecedented warmth. Again, it might be questioned whether the increase in fighting power was proportionate to the increase in the cost of the later ships. In comparing the 'Dreadnought' with the 'Devastation,' M. Dislère, the eminent French naval constructor, observed that, in order to secure a slight increase in armour and armament, the displacement had been enlarged from 9,340 to 11,130 tons, an augmentation of 1,790 tons, involving an addition of 80,000*l*. to the cost and an addition of 33 feet to the length. 'How,' he asked, 'would such enormous masses be manœuvred in the confusion of a naval engagement? How would the ram, the most effective weapon, be used to the best advantage?' These were questions on which the battles of the future might teach some unexpected lessons. He might quote opinions to the same effect from the separate report of Admirals Elliott and Ryder, as members of the Committee on Designs for Ships of War, and from many other officers. There was reason to fear that our shipbuilding policy was conceived too much under the influence of a spirit of international rivalry. The popular view of these subjects was derived from experimental firing at targets, or from trials over the measured mile, and not from any experience or conception of the practical conditions of naval warfare.

The same tendency which was observable in the designs for ships was exhibited in their armament. Considering how small a percentage of shot could possibly take effect when the combatants were moving at high speed, it became a question how far we ought to go in the introduction of 80-ton or even 38-ton guns, as the principal—in some cases the only—armament of our ships. The Committee on Designs had recommended the general adoption of a composite armament of protected and unprotected guns. This valuable suggestion had not received sufficient attention.

Speaking generally, the armament of the most recent ships was not proportionate to their tonnage; the offensive power had been unduly sacrificed to the defensive, the gun to the armour. The 'Devastation,' of 9,000 tons, had only 140 tons of ordnance, and the 'Inflexible,' of 11,000 tons, only 320 tons of ordnance. Would not such a ship be more fitted for naval warfare by the substitution of 200 tons of ordnance for an equal weight of armour? The 'Nelson' and 'Northampton,' of 7,460 tons, carry four 18-ton guns and eight 12-ton guns. M. Dislère spoke favourably of the designs of these ships, but considered that the guns should be of heavier calibre. An 18-ton gun was not powerful enough for an engagement with a first-class ironclad, and the displacement of 7,440 tons was too large for ships intended only for the protection of commerce.

Increase of
defensive
over offen-
sive power

The recent operations of the fleet in confined waters afforded a telling illustration of the value of the smaller classes of fighting vessels. While the splendid ships assembled under Admiral Hornby possessed great power for battle, they were mostly designed for ocean warfare rather than for inland service. A deep draught of not less than from 26 ft. to 27 ft. was a serious drawback when

Moderate
dimensions

Light
draught
ships
wanted

operating along the shore. The Royal Commission on our Coast Defences laid it down that the maximum draught of a coast defence vessel should not exceed 15 ft. How many ironclads did we possess drawing less than 15 ft. ? It was for naval operations on the coast that the Americans invented the monitor, and no other navy has had more experience of coast warfare under modern conditions. Of the 30 monitors in the United States Navy during the war, only one was destroyed by the fire of the enemy. The monitor, or armoured gunboat, was being rapidly introduced in European navies. The Germans have constructed two, and five armoured gunboats of 900 tons displacement, protected by 4-inch armour, and carrying one large gun. Of the 27 ironclads in the Russian Navy, 22 were designed for coast defence ; seven drew from 19 ft. to 17 ft., one 14 ft., and 13 drew 11 ft. and under. The latter were exact reproductions of the American types.

Want of
rams and
torpedo
vessels

Another deficiency might be pointed out in our Mediterranean Fleet ; our large ships were unsupported by a supplemental force of steam rams and torpedo vessels. It was not necessary to insist on the offensive power of the torpedo. The House had been sufficiently alarmed by the very able and stirring speech of the hon. and gallant member for Waterford. In the Session of 1876, at the Institute of Naval Architects, Mr. Barnaby had acknowledged the vulnerability of our largest and most powerful ironclads if attacked with the ram and torpedo. He pointed out, with the concurrence of Sir Spencer Robinson, that the strongest defence against such an attack was by a counter-attack with similar vessels attached to large ships. Admiral Porter, in his annual report to the Secretary of the United States Navy, had returned again and again to this subject. In

the year 1874 he asked for 50 iron torpedo boats of not less than 100 tons each. He had since recommended that six of little more than 1,000 tons should be constructed of iron for foreign service. The Americans had lately built a torpedo vessel, the 'Alarm,' which carried one heavy gun, eight Gatlings, and a complete torpedo equipment. The programme for the German Navy provided for 28 torpedo vessels, which were to be completed in the year 1882. Torpedo boats had become an essential feature in the equipment of a fighting ship. In the German Navy, the 'Sachsen' class of armoured corvettes, of which there were to be five, with a displacement of 7,300 tons, carried boats of large size. The 'Duilio' was fitted with special appliances for launching torpedo boats in a seaway. The estimates which had been laid before them provided for the construction of 28 torpedo boats in 1878-79. The number was greatly inferior to the flotilla which, according to common rumour, was lately being prepared for the Russian Navy. Armoured vessels possessing in a high degree the manœuvring qualities which were essential in the ram were indispensable to a fleet of larger vessels. It was stated by Mr. Ward Hunt, in moving the estimates of last year, that it was in contemplation to build a ram on the plans of Sir George Sartorius. No progress had been made in carrying out that intention. Our most heavily armoured ships were too large to be manœuvred as rams. Why had nothing been done in the construction of auxiliary vessels, which were so essentially required to complete our fleet? Small rams and torpedo boats would have cost a mere fraction of the sums expended on the large ships, around which they ought at this moment to have been grouped in the narrow waters of the Sea of Marmora. Accepting the

Increase
of foreign
torpedo
boats.

necessity of limitation in size, we must build special vessels for each arm of the Navy. Captain Colomb had said that we had no ship in our Navy in which the principle of building special vessels for special services had been satisfactorily embodied ; we had no ship in which the gun power had been properly sacrificed to assist the ram, or the ram power judiciously curtailed to admit of increased ordnance. The first-class battle ships of the future would doubtless be constructed after the type of the 'Devastation.' The large ships, again, must be supported by armoured rams, torpedo vessels, and torpedo boats. For ocean warfare we required belted cruisers, of which the 'Nelson' and the 'Shannon' were our latest examples ; for the protection of commerce we needed small lightly armoured vessels ; for coast warfare, rams, monitors, and torpedo boats. The proportions in which those several types were required was a question which the committee recommended by his hon. friend (Mr. Seely) would examine with great advantage.

Unarmoured
construction

Passing from the armoured vessels he must express his regret that such large sums had been expended on unarmoured vessels in no essential respect more powerful than the fine ocean steamers which could be hired in an emergency for naval service. Large unarmoured ships, such as the 'Shah,' the 'Raleigh,' the 'Iris,' and the 'Mercury,' in which every other quality had been sacrificed for the sake of speed, and which from their limited coal-carrying capacity were conspicuously inferior to the American liners in their power of maintaining that speed, gave the least satisfactory result in proportion to their cost which had ever been obtained in any vessel built for war. He observed with satisfaction that the large unarmoured ships had disappeared from the shipbuilding programme, and that the resources of

the dockyards were to be concentrated on fighting vessels. Every ship exceeding 1,200 tons which was specially constructed for naval warfare should be protected by a certain amount of armour. The effect of a single chance shot on an unprotected vessel was sufficiently shown in the action between the 'Alabama' and the 'Kearsage,' and, in the Franco-Prussian war, in the action between the 'Meteor' and the 'Bouvet.' The Americans protected the machinery of their vessels by using the cable as a temporary chain armour. By a slight reduction in the length and a moderate increase in the beam, sufficient floating power would be gained to enable our larger unarmoured cruisers to carry a light belt of armour at the water-line, which would materially strengthen the bow for ramming, and protect the machinery and the boilers. The hon. member for Pembroke had shown how that could be done practically in the three belted cruisers which he had recently built for the Japanese Government. He could wish that class of vessel were more numerous represented in our Navy.

The 'Dreadnought,' which was commenced in February, 1870, and launched on March 8, 1875, was not yet completed. The original estimate for that ship was 269,000*l*. It was now set down at 451,000*l*. The waste of public money through repeated modifications of a design during construction was denounced, with his usual force, by Mr. Cobden, in his well-known pamphlet on the 'Three Panics.' Those remonstrances were equally needed at the present time. Sir William Thompson believed that a scientific council would have prevented the fatal error committed in the case of the 'Captain.' Mr. Anderson, who had been responsible for the expenditure of nearly three millions of the public money, was persuaded that with a systematic investigation great improvements could

Alterations
during construction

Defect of
Admiralty
adminis-
tration

be introduced. In the Government service, as he most truly said, everybody who got any work to do worth mentioning was overpowered with work and had too little time for deliberation and reflection. The Naval Lords could not possibly have the leisure to consider thoroughly the numerous questions of naval architecture, tactics, and organisation which constantly presented themselves. They should be relieved of much of the detail which now occupied their time by the appointment of a captain of the Navy to act as their secretary, or *chef de bureau*. The members of the council should be appointed for limited periods, and should be regarded solely as advisers to the Minister, who would retain, as now, his sole responsibility to Parliament. Nothing could more conclusively prove that the Constructor's Department was not strong enough for the work which it had to do than the slow progress in the completion of designs for new ships, which was indicated in the Estimates they were about to consider. It was three years since a new ironclad was laid down in Her Majesty's Dockyards, and yet that interval, regrettably long as it had been, had not been sufficient to enable the Constructor's Department to determine the types of any one of the ironclads which it was proposed to commence in the ensuing financial year. The only two ironclads now in course of construction in the dockyards were included in the programme of 1875-76.

French
system for
designs

In the French service the Constructor's staff was materially strengthened by appointing officers to the dockyards possessed of the highest scientific attainments, and capable of preparing independent designs for ships of war. It was the practice of the Council of Construction in Paris to fix on the type of ship required for a particular service, and having stated the various qualifi-

cations which must be embodied in the new designs, competition was then invited from the different dockyards. In pursuance of that system we found among vessels actually under construction that no less than four naval architects were individually responsible for the designs adopted. The Constructive Department of the Admiralty was overtasked and ought to be strengthened. The administrative, consultative, and scientific functions should not be combined in one hand ; the same individuals ought not to propose designs and afterwards pass them in review. It was suggested by the Royal Commission on Scientific Instruction that a Council of Advice should be appointed by the Government. The evidence collected with reference to the Controller's Department of the Admiralty clearly showed that the present staff were too much absorbed in their administrative duties to be able to give a due proportion of time and thought to original investigation. The recommendations of the Royal Commission on Scientific Instruction were based on the evidence of such men as Mr. Froude, Sir William Thompson, Mr. Anderson, the Superintendent of Machinery at Woolwich, and the hon. member for Pembroke. Mr. Froude told the committee that if such a council had existed enormous sums would have been saved, which had been expended in the construction of ships on a scale of 12 inches to the foot. The incompleteness of the preliminary investigations had led not only to defective designs, but to wasteful expenditure and long delay. The proposal for a committee implied no want of confidence in the First Lord of the Admiralty, whose appointment had been received with general approval. The First Lord, however, and his naval advisers were too much occupied in administrative duties to mature designs for ships of war. In

Admiralty
Council
on Designs

former years committees of inquiry into naval questions had been frequently appointed, and their labours had not been unfruitful. In France the Commission of the Chamber of Deputies was annually appointed to examine the naval estimates. The report for the present year by M. Bethmont embraced the whole subject of naval administration, and threw a flood of light on many of the most difficult problems of the time. It was such a report as he hoped might be presented by a committee of the House of Commons. He concluded by again expressing his conviction that, while our administration still leaves something to be desired, the Navy was in a sound and wholesome state, and never relatively more powerful than at the present time.

VI

NAVAL CONSTRUCTION

SPEECH DELIVERED IN THE HOUSE OF COMMONS,
MARCH 10, 1879

BEFORE entering upon other topics, an agreeable task devolves on all who take an interest in the Navy. The Navy deserves the acknowledgments of the country for the many proofs of its efficiency which have been afforded during the past year.

The condition of the Coast Guard was tested, with highly satisfactory results, in the special service squadron under Admiral Key. The duty, undertaken by Lord John Hay's squadron, of landing a numerous army and 40,000 tons of stores under the burning sun of Cyprus was most laborious, and it was cheerfully performed. The men worked from four in the morning till seven in the evening, under the personal command of the Duke of Edinburgh, and they worked without a murmur.

During a recent cruise in the Mediterranean, I was repeatedly in contact with the Navy, and it was evident, even to the eye of a civilian, that every officer and man under Admiral Hornby's command was determined to do and dare anything that the country might require of him. I know not whether to admire most the fighting spirit which animated the fleet, or the excellent discipline by which that spirit was kept under control during

the long, anxious, and weary period of expectation which the fleet had passed in the Sea of Marmora.

The debate on Vote I. affords a convenient opportunity for discussing the important question of the pay of the Navy. That question has been raised in the House in former years, in able speeches, by the noble and gallant lord, the member for Waterford, and by the honourable member for Reading.

Pay of
seamen

The pay of the able seaman in the navy is 1s. 2d. per day. Recently an additional 2d. per day has been given to all continuous-service men on re-engaging after ten years' service. The average pay of seamen of the mercantile marine in the ports of the United States varies from 6*l.* to 8*l.* per month. On the Australian station the average wages are on a still higher scale. The Royal Navy undoubtedly offers many advantages over the merchant service, not the least considerable being the prospect of a pension. The young seaman, however, attaches little value to a prospective benefit. Captain Wilson, the Commodore on the Australian station, has estimated the annual loss by desertion at 500 men, and the average cost of training an able seaman at from 300*l.* to 400*l.* Commodore Wilson proposed to increase each man's pay every five years by 2d. a day, or 3*l.* a year, whatever his rating might be, provided it was not below that of A.B., and by 3d. a day for each rating above that of A.B. The proposed increase of pay might be limited to sea-going ships, perhaps even to vessels serving on certain foreign stations. Married men lose money when serving in a sea-going ship, and the best-conducted men are always scheming to serve in harbour-ships.

The extra pay to the army in India, and the extra premiums on policies of insurance exacted from officers

on foreign stations, afford a strong argument for a higher rate of pay to the seamen of the Navy when serving abroad. Desertion is comparatively rare in the home ports, in the Mediterranean, and on the China and East Indian stations. In other parts of the globe it is a source of deep anxiety and mortification to the officers in command of Her Majesty's ships. When I was in the River Plate, in 1876, I went on board a gunboat, which had just received a batch of young ordinary seamen from England. On the morning after their arrival, three of these young men deserted, causing a loss to the country of at least 1,000*l*.

The subject has been repeatedly urged upon my attention by naval officers whom I have met abroad, and I have lately received a long and able letter on the subject from a distinguished admiral, whose flag is now flying in a foreign station, where the Navy is particularly liable to suffer from desertion.

Turning from the *personnel* to the *matériel* of the Navy, two great fleets have been assembled during the past year—the special-service squadron under Admiral Key, and the fleet under Admiral Hornby. In the squadron under Admiral Key the coast-defence vessels are a characteristic feature. The ‘Glatton’ and the four vessels of the ‘Gorgon’ class have been severely criticised in the debates at the United Service Institution. It has been truly said that they are not seaworthy, and no vessels can be accepted as effective for the defence of the stormy coasts of Great Britain unless they are absolutely seaworthy. The defects of the ‘Gorgon’ class, and the comparatively inexpensive means by which those defects may be remedied, were pointed out by Admiral Ryder in the course of the discussion at the United Service Institution. He

‘Gorgon’
class

remarked that, as regards the 'Gorgon' class, the Committee on Designs had condemned these vessels as sea-goers. Their unanimous report was that if a certain superstructure extending along a good portion of each vessel's side was not put on, they could be depended upon to go from port to port with safety only in fine weather. That, said Admiral Ryder, was a very startling statement to make about ships of war. And yet the superstructure referred to has not yet been put on, although five years have elapsed since the suggestion was made. I scarcely dare to offer an opinion of my own on such a subject; but the necessity and feasibility of the proposed alteration must be patent to eyes which have any familiarity whatever with naval structures. With the superstructure, the 'Gorgon' class would present a similar appearance, of course on a reduced scale, to the 'Dreadnought'—the most satisfactory type of battleship in the British Navy. Their buoyancy and stability would have been much improved. They might have been sent out with confidence to reinforce the squadron under Admiral Hornby; and their suitability for operations in the Dardanelles and the Bosphorus cannot be disputed.

Our noble ironclads in the Sea of Marmora were designed for ocean service, for which their high free-board is especially adapted. We want such vessels, but we also require a flotilla of the American monitor type for coast-defence and coast-attack.

I now invite the Committee to look for a few moments at the work in progress in foreign dockyards. The only navies for which ironclads are at present in course of construction are those of France, Germany, Italy, and the United States. The Germans are building three ships of the 'Sachsen' type, of 7,398

tons, protected by 10-inch armour, and carrying their guns in fixed turrets on the upper deck. These ships can be completed in two years. They are also building four armoured gunboats of 1,000 tons, with 8-inch armour. The French are building a turret-ship of the 'Duperré' type, of 10,000 tons, with 22-inch armour ; two central battery ships of the 'Foudroyant' type, of 9,608 tons, with 15-inch armour ; three armoured corvettes of the 'Bayard' type, of 5,880 tons, with 10-inch armour ; two coast-defence vessels of the 'Tonnerre' type, of 5,500 tons, with 13-inch armour ; and two rather smaller ships of the same class, of 4,524 tons. The corvettes have been lately commenced ; the other vessels can be completed in about two years. The United States have five monitors building—the 'Puritan,' of 5,300 tons, with 11 inches of solid armour ; the 'Miantonomoh,' of 4,000 tons, with 11 inches of laminated and 5 inches of solid armour ; the 'Monadnock' and 'Terror,' of 3,600 tons ; and the 'Amphitrite,' of 2,800 tons, with inferior armour protection. The Italians have in completion their two well-known ships, the 'Dandolo' and the 'Duilio.' The 'Lepanto' and the 'Italia,' each of 14,000 tons, are on the stocks.

France

United States

Italy

A list of the armoured ships in construction, which I have compiled from the best published sources of information, show a total of 27,000 tons for the German Navy, about the same for the Italian, 67,000 tons for the French, and 19,300 tons for the United States, against 53,000 tons for the British Navy. Of tons displacement we are to build during the ensuing financial year about 11,000 tons. The French construction for the same period I estimate at 9,000 tons, the German and Italian at 5,500 tons, and that of the United States at 4,000 tons.

Summary

Dockyard
reductions

I consider the proposal of the Government as not in adequate, having in view the additions to the armoured fleet by purchases from the vote of credit. I regret, however, the dismissal of good workmen from the dockyards, and believe that the present reduced numbers must hereafter be increased. The fluctuations in the numbers employed not only inflict great inconvenience on the workmen, but involve expense to the country. You cannot expect to obtain labour so cheaply for a temporary as for a permanent employment. Considering the vast and growing importance of our colonial empire, the extent of our shipping, and the dependence of a large portion of our population on imported food, and looking also to the naval force maintained by other Powers, to whom a navy is an object rather of national vanity than of necessity, an annual expenditure of 12,000,000*l.* would not be an exaggerated charge for the British Navy. When we contrast the relative importance and cost of the Navy and the Army, it would seem that it is to the land service rather than to the Navy that the pruning-knife should be applied.

Italy;
smaller
ships
desirable

I will not trouble the Committee further as to the progress of construction, and will now proceed to say a few words on our shipbuilding policy generally. It is only in Italy that designs of colossal dimensions have been adopted, and even there they are approved by a small section only among the officers of the navy. I owe the privilege of seeing the 'Italia,' now in course of construction at Castellamare, to the great kindness of my right honourable friend, the First Lord of the Admiralty.

It is not at present in contemplation to follow the Italian constructors in building ships of extended dimensions. Public opinion, always so susceptible on the question of our naval supremacy, may perhaps here-

after exert a pressure in that direction. It may not therefore be superfluous to state the arguments against the introduction of ships like the 'Italia' into our own Navy. There is much to admire in the details of the 'Italia,' but considering that the abandonment of side-armour is an essential feature in the construction of that vessel, and that the great dimensions of the 'Inflexible' class have been adopted, with all their attendant disadvantages, solely with the view of carrying an increased weight of armour on the sides, I cannot think that the Italians are wise in building so large a ship. The design has been defended, on the ground that it insures an invaluable superiority in regard to coal endurance. Let us follow up the argument. It is admitted that ships of 9,000 tons can be built capable of attaining the same speed as the 'Italia,' and possessing a marked superiority in evolutionary qualities. When the ram is resorted to—*ceteris paribus*—the battle will be decided in favour of the fleet which has an advantage, in point of numbers, of two ships to one, the more numerous ships being as superior in evolutionary qualities as in numbers. With an equal expenditure, an unquestionable superiority for battle would be attained with ships of the 'Colossus' and 'Agamemnon' type, as compared with the 'Italia.' It is argued that the 'Italia,' having the advantage in point of coal-endurance, would decline battle, steam away from the smaller ships, bombard our undefended ports, and intercept our commerce. The rôle of the 'Italia' is therefore to be that of the 'Alabama.' While the former will cost three-quarters of a million sterling, the latter was probably built for one-twentieth of that amount.

Arguments
against
big ships

In regard to the general policy of naval construction,

Captain
Colomb
on strategy
in con-
struction

Captain Colomb, the gifted author of the prize essay of the United Service Institution, has made the following observations: 'Looking to the fleet as a movable force, the main object should be to have, to the greatest possible extent, the power of concentration and the power of dispersion. The policy of marine construction must be based on this primary strategical principle. Applying this principle to the individual ship, the "Inflexible," it may be asked, Does such an accumulation of expenditure on a single vessel represent the greatest power of concentration and dispersion over the area within which our naval forces are to act?' Viewed in this way, and assuming that the object of strategy is to insure the right force being at the right time in the right place, Captain Colomb would, as a matter of sound policy, increase the number of ships rather than attempt to gain tactical results satisfactorily in one ship by the sacrifice of strategical qualities.

Size of
new ships

I rejoice that these principles have prevailed in the latest decisions of the Admiralty in respect to ship-building. The four largest ships now building are under 9,100 tons. The 'Conqueror' seems to be designed especially to meet the suggestion put forth by Mr. King, the chief engineer of the United States Navy, who, in his report on the ironclads of the European navies, concludes the description of the 'Inflexible' with a suggestion that two vessels of smaller dimensions, each carrying two 80-ton guns instead of four, probably would have been a safer and in some respects a better investment.

The advocates of moderate dimensions do not desire to cut down the estimates. They wish to divide the risk of naval warfare, to increase the evolutionary qualities of our ships with a view to the use of the ram, and to secure to the Royal Navy the essential advantage of numbers.

VII

DOCKYARD ADMINISTRATION

SPEECH IN THE HOUSE OF COMMONS, JULY 31, 1879

MR. BRASSEY rose to call attention to the responsibilities, rank, and emoluments of the professional officers in Her Majesty's naval yards. He said the position of the constructive departments in our dockyards was by no means an unimportant question, for if the constructors of the Navy were inefficient, our dockyard management would be a failure. Our ships would be too costly, or they would be badly built. On these two cardinal points of cost and workmanship the constructors were solely responsible. It was laid down in the well-known memorandum of Sir Spencer Robinson, prepared for the Duke of Somerset's Committee on the Board of Admiralty, that the superintendent was in no sense responsible for the quality or the cost of the work done in the dockyards. He was the vehicle through which orders passed from the Admiralty to the heads of departments; but if a work which ought to have been done for 10,000*l.* cost 16,000*l.* he was not called upon to account for this excess. When a question was asked, he directed the master shipwright to reply. All the naval superintendents who were examined by the Dockyard Commissioners in 1860 took a similar view of their position. The inquiry into the loss of the 'Megæra' brought out distinctly the sole responsibility of the

professional officers for advising the Captain Superintendent, and through him the Board of Admiralty, as to the seaworthiness of a ship for any voyage or service that she was to undertake. He wished distinctly to disclaim any desire to see the naval superintendents of dockyards superseded by civilians. But it was obviously most important that the constructors should be qualified to bear the weight of responsibility thrown upon them. They should be men of education, technical knowledge, and experience, and with ability to direct the labours of large bodies of men.

Pay and
rank of
dockyard
officers

He asked the House seriously to consider whether the rank and emoluments of these officers were sufficient to command in all cases men of the necessary qualifications for the Public Service. The unsatisfactory position of the constructors was described by Mr. Oliver Lang, the able master shipwright at Chatham, in his evidence before the Dockyard Commission in 1860. 'I do not,' he said, 'object to a considerable infusion of the working class, and their being allowed to rise to the highest offices in the branch. I complain that the sons of gentlemen are shut out entirely.' No substantial change had been made in the system of recruiting officers for the Constructor's Department since Mr. Lang's evidence was given. It was stated by Mr. Barnes, the Surveyor of Dockyards, in his evidence before the Stores Committee, that the present master shipwrights, in almost all cases, had been originally entered as apprentices in the dockyards.

Admiral
Smart's
committee

The position of the professional officers of the dockyards was the subject of very serious consideration on the part of the Committee on Dockyard Economy, of which Admiral Smart was the chairman. That committee recommended that the *status* of the civil officers in

dockyards should be raised. The line between the employers and the employed had been very indistinctly drawn, and there had been a tendency to class the chief professional officers among the employed. The master shipwrights and chief engineers should thenceforward be looked upon as commissioned officers, and be considered as identified with the Admiralty as the directors or employers of the labour, and not with those who execute the actual manual labour. A superior position in society and a superior education would always have their weight, when placed in a proper position.

The Commissioners who conducted the inquiry into the loss of the 'Megæra' made some strong observations on this point. They said :

' We feel compelled to remark that we have formed, however unwillingly, an unfavourable opinion as to the mode in which the administration of Her Majesty's dockyards is generally conducted. The officers appear to us too often to have done no more than each of them thought it was absolutely necessary to do, following a blind routine in the discharge of their duties, and acting almost as if it was their main object to avoid responsibility.' What had been done since these reports were presented to stimulate the zeal of the professional officers in the dockyards? The master shipwright was now called chief-constructor, but was still subordinate to the master attendant. The head of the Shipbuilding Department, who at Portsmouth, for example, had from 4,000 to 5,000 men under him, ranked below the head of the Rigging Department, who had only 440 men under his orders. Sir Houston Stewart had very justly called attention to this anomaly. While their relative rank remained unchanged, only a trifling addition had been made to the salary of the professional officers. He would

Commission on the
'Megæra'

Subordi-
nate posi-
tion of
chief-con-
structor

take Portsmouth as an example. In 1868-69 the salary of the chief constructor was 700*l.* a year, and that of the chief engineer 650*l.* ; together, 1,350*l.* At that time 3,460 men were employed in the dockyards, their wages amounting to 210,258*l.* In 1879-80 the salary of the chief constructor was increased to 850*l.* but that of the chief engineer was reduced to 534*l.* a year, the joint salaries of the responsible heads of the two great departments of the dockyard being 1,384*l.*, or an increase of 34*l.* only on the total amount paid ten years before. In the meanwhile the number of men had been raised to 4,961—an increase of 1,500 in number, their wages amounting to 326,000*l.*, or an increase of 116,000*l.* a year.

Waste in
alterations
and repairs

He had referred to the case of the 'Megæra' as an example of the disasters that might occur from neglect of duty, but neglect of duty, in the form of omission to do a thing which ought to have been done, was, happily, a rare occurrence in Her Majesty's dockyards. Extravagance and waste in going beyond the necessity of the case in the matter of alterations and repairs were far more common, and we had done nothing to encourage thrift and economy. The results that necessarily followed had been pointed out, not only by committees and commissions, but by independent critics of great authority. Admiral Smart's committee had referred to this question in their report. They thought that too little regard had been paid to cost as distinguished from workmanship, and they recommended that some tangible mode should be provided by which any officer could be able to claim the credit of public approbation for any economy to the Public Service which had been obtained by his good management. Persons accustomed to administrative business would readily concur in the observation of

Lord Clarence Paget, that 'where one dockyard is found to conduct its business more economically than another, it should be an understood thing that the officers of that yard, who had, by their attention to these important matters, caused a saving of public money, should be advanced—that encouragement should be given to economy.' Nothing, however, had been done to carry out that suggestion. No instance had occurred of an officer having been dismissed or suffering a loss of salary for extravagance, nor had any officer been promoted, or pecuniarily rewarded, for economical administration. There was no equitable principle in the amounts of the salaries awarded to the chief constructors at the several yards. The chief constructor at Portsmouth received 850*l.* for supervision over an annual expenditure of 326,191*l.* on wages and probably an equal amount on stores. The chief constructor at Pembroke had 700*l.* a year for supervision over a body of men whose aggregate wages amounted to 97,000*l.*

Encourage-
ment to
economy

In connection with this subject he would call attention to the strong representations which had been made by Admirals Hall, Chamberlain, Fellowes, and Sir Cooper Key to the Committee on Stores, as to the great importance of constant personal supervision of the work in progress on the parts of the chief constructors in the several dockyards. The success attained in Pembroke Dockyard in building ships within the estimates had been exemplified in several remarkable cases which were quoted by Admiral Hall. These results he attributed to the great care which the professional officers at Pembroke were able to bestow on their work from having time enough at their disposal to give the requisite attention to the details of construction. Admiral Fellowes made a strong representation on the same subject. He

Opinions
of naval
officers

said it was imperative that the constructive duties of the yard should receive more attention. There were at Chatham 3,800 men at work—men who were working night and day—and there was only one chief constructor and one constructor ; whereas under the old system the work would have received the supervision of a chief constructor, two constructors, and other officers, and this at a time when a smaller number of men were employed and the dockyard covered only 90 acres, instead of, as at present, 500 acres. According to the present practice, the officers of the yards had but a small share in the preparation of the estimates. He would propose that whenever it was contemplated to build a ship in a particular dockyard, the chief constructor should be called upon to prepare an estimate of the cost. That estimate should be revised, and when an agreement had been finally established between the Admiralty and their local officer as to the amount, the figures should be bracketed in the Navy Estimates with the name of the responsible dockyard officer. A spirit of emulation would thus be encouraged between the different yards, while bad workmanship might be prevented by the frequent supervision of an Admiralty surveyor.

French
construc-
tive de-
partment

The organisation of the French constructive department had been referred to by the hon. member for Nottingham in his speech of last Session on our ship-building policy. It was equally worthy of examination in connection with the points to which he now called attention. The French professional officers held a higher relative rank than we had accorded to our constructors. The 'Ingénieurs de la Marine' were selected from the Ecole Polytechnique, and their promotion was secured by an appropriate gradation of ranks corresponding with those established in the executive branch of the

navy. The staff included an inspector-general, who ranked with but after a vice-admiral. He resided in Paris and made periodical visits to the ports. Under him were eleven directors of naval construction, all ranking immediately after a rear-admiral in the French Navy, but before a captain. At the ports the constructive department was represented by an inspector-in-chief of the naval administrative services, who was charged, in the name of the Minister of Marine, with the supervision of all the professional work in the dockyards. The inspector was subordinate in rank to the Préfet Maritime, who was a vice-admiral, but in the discharge of his duties he acted under the orders received from the Minister of Marine, and corresponded directly with him. The constructive staff for the English Navy should be selected from the Academy at Woolwich. They would receive their special training at Greenwich and at the dockyards. They should have an honourable relative rank, like that which was given to the Corps of Naval Architects in the French Navy, and be entitled to the privilege of wearing a civil uniform. The criticisms of foreigners were often most suggestive. M. Xavier Raymond, formerly a frequent contributor on naval subjects to the pages of the 'Revue des Deux Mondes,' made the following remarks in his volume entitled 'Les Marines de la France et de l'Angleterre':

'By an anomaly most remarkable the administration of the Navy is conducted by a Board, and that Board is selected almost exclusively from one only of the numerous specialities which must be combined in order to constitute a naval establishment. Of the six individuals who form the Board two are Members of Parliament and do not belong to the Navy. The four others are naval officers. The administrative branches, works, and buildings,

French
opinion
on our
Board of
Admiralty

naval construction, gunnery, health, are all rigorously excluded.'

Inferior
position
of con-
structors

As for the constructors in the ports, if their salaries were not inadequate, they occupied a position of inferiority in relation to the executive branches, unworthy of the talent and the services of several of their number. The result was that certain individuals, and those perhaps the most distinguished, have left the service. The name of Mr. Reed is quoted as a prominent example. He would venture to urge that the constructors of the Navy should be constituted as a distinct corps, like the *Ingénieurs de la Marine* in France, and that we ought to have one or more naval architects in every dockyard capable of preparing competitive designs for new ships. In the French service, the work of the central office was limited to the specification of the qualities and the general features of the new ships which it was proposed to build. The programme having been prepared at headquarters, the dockyards were invited to furnish competitive designs, and the most successful was selected. That plan insured a wide development of ideas, and prevented the shipbuilding of the Navy falling into a groove under the direction of a single mind.

Council of
construc-
tion

Turning from the dockyards to the Council of Construction, he found that the highest shipbuilding officer in the Navy had a salary of 1,200*l.* a year. The responsibility for the design and construction of new ships and for supplying those ships with proper machinery, rested exclusively with the civil members of the staff of the Controller of the Navy. The Controllers themselves have on all occasions most fully acknowledged their dependence on the aid of professional men. He put it to the House to consider whether the present salary of 1,200*l.* should or should not be regarded as a *maximum*,

and whether it might not be expedient to hold out to the Chief Constructor of the Navy some further prospect of honorary or pecuniary advancement. Was Mr. Reed altogether wrong when he said, in his evidence before the Duke of Devonshire's committee on scientific instruction, that it seemed to him to be quite out of the question that the Chief Constructor of the Navy—a man who had been admitted in Parliament by the First Lord of the Admiralty to have been capable of saving or losing a million of money in a short period—should be receiving a salary of 900*l.* a year, as it was when he first entered the Admiralty, or 1,500*l.* a year, as it was when he left? It was well known that managers of private establishments were receiving very much greater incomes.

The Engineer-in-Chief of the Navy held an office second only in importance to that of the Director of Naval Construction. He was the adviser of the Controller and of the Admiralty generally on all that related to the steam branch of the service. He held a highly responsible position in relation to contracts for the supply of machinery. The Estimates for the present year provided for the purchase of machinery at a cost of 396,000*l.* It was not enough that the Chief Engineer of the Navy should possess a competent technical knowledge. He must be capable of defending his opinions before the Board of Admiralty and the Council of Construction. Was it quite consistent to give 1,000*l.* a year to the Chief Engineer of the Navy while the Directors of Transport and of Works, who were executive officers, and were rewarded with the Order of the Bath and the other distinctions awarded to the executive line, were respectively receiving 1,550*l.* and 1,300*l.* a year? By a return of all civilians employed by the Crown, which was moved for by his right hon. friend below him (Mr.

Engineer-in-Chief

Insufficient salary

Childers), and which had recently been presented to Parliament, it appeared that 1,040 persons were employed in the civil, judicial, and revenue departments, at a total annual charge of 1,437,000*l.* a year, giving an average salary of 1,400*l.* a year. In that long list of 1,040 favoured officials no civil officer employed under the Admiralty had been fortunate enough to be included. That exclusion was hardly consistent when they came to consider that the greatest Navy in the world was built, equipped, and repaired under their supervision. He had no desire to see changes suddenly introduced, without regard to the individual merits of the officers employed. He fully appreciated the difficulties of the political heads of the Admiralty in this matter. They might be excused if they hesitated to give a very rapid advancement to officers of whose capacity they could have but scanty personal knowledge. They would all agree, however, that talent could only be attracted to the Public Service and retained in it by offering positions worthy of acceptance. The Admiralty might begin, as opportunity offered, by improving the position of heads of departments at Whitehall. The case having been stated, he would leave it with confidence to the experienced judgment and mature consideration of the First Lord of the Admiralty and his colleagues.

VIII

NAVAL ADMINISTRATION

LETTER TO THE 'TIMES,' APRIL 7, 1880

HAVING watched the administration of the Navy during the last fifteen years with close attention, I venture to offer a few observations on the controversy between the First Lord of the Admiralty, Sir Spencer Robinson, and Mr. Shaw-Lefevre, on the subject of shipbuilding in our dockyards.

It must be admitted by every impartial observer that the reductions in the number of workmen in the dockyards were carried too far in the earlier years of Mr. Gladstone's administration. But the responsibility for those reductions belongs at least as much to Mr. Corry and to Sir Spencer Robinson as to the able administrators who filled the office of First Lord of the Admiralty in the late Cabinet. The reductions proposed to Parliament by Mr. Childers were based on a report prepared in 1870 by Sir Spencer Robinson, as Controller of the Navy, for the guidance of the Board, of which he himself was a member. The report opens with a review of the dockyard expenditure during the four preceding years. It gives the number of men employed in the dockyards and the expenditure on wages from year to year. In the Estimates for 1866-67, prepared by the Duke of Somerset's administration, provision is made for

Dockyard
workmen

Numbers of
dockyard
workmen

18,618 artificers, and for an expenditure in wages of 1,065,194*l*. No appreciable change was made in these figures in the estimates for the following year, for which Sir John Pakington was responsible. In 1868-69 there was much discussion at the Admiralty in reference to the Estimates, and the late Mr. Corry, who had originally contemplated a large addition to the shipbuilding work, both in the dockyards and by contract, finally proposed a reduction of 3,049 artificers in the Government establishments. The number borne in the previous year having been for some time in excess of the number voted, no less than 4,000 men were discharged, and arrangements were made for closing Deptford yard. No reduction under succeeding administrations was so sweeping as that enforced under the Admiralty of 1868. Where great fluctuations occur from year to year in the amount of work carried out in the dockyards, economy is impossible. The sudden change of policy adopted by Mr. Corry offered a bad precedent to succeeding administrations.

In the Estimates for 1869-70, as revised by Mr. Childers, the number of artificers and labourers to be employed in the dockyards was reduced by 1,130; but the total tonnage to be built fell short of the amount for the previous year by 986 tons only, and the ironclad construction was actually raised from 7,538 to 8,866 tons. The construction of new ships was prosecuted with unabated activity by diminishing the strength of our foreign squadrons, and thus lessening the demands on the dockyards for repairs and reliefs.

The Estimates for 1870-71 were framed in accordance with the rigorous principles of retrenchment to which Mr. Gladstone's administration was pledged, and the pruning-knife was applied almost exclusively to dock-

yard expenditure. The number of workmen was fixed at 11,276, being a reduction of 2,866 as compared with the previous year. Mr. Childers belonged to a Cabinet determined on a vigorous effort to keep down expenditure ; but the economies for which he is responsible were made with the entire concurrence of his professional adviser. Sir Spencer Robinson had stated, in the report already quoted, in reviewing the shipbuilding operations in the dockyards in 1869-70, that 'the very great care exercised in undertaking repairs, and the steady discouragement given to expending money on obsolete ships showed that a larger provision had been made under the head of repairs and maintenance than was strictly necessary. Hence the administration was able in 1870 to propose a considerable reduction in the number of artificers for the ensuing year. . . . To keep pace with the wants both of ironclads and of wooden ships, an addition of about 19,000 or 20,000 tons per annum is fairly necessary. Of this, about 15,500 tons, equally divided between armoured and unarmoured ships, might be built in our dockyards. I believe that 11,000 artificers and 625,000*l.* in wages would build the above amount annually and maintain what it is really necessary to maintain.'

Reduction
of numbers
in 1870-71

Sir Spencer Robinson was clearly under the impression that the previous expenditure on repairs had been extravagant. While assenting to an aggregate reduction of not less than 2,866 men, he had at the same time contemplated a new distribution of the dockyard labour, allotting only 4,297 men to repairs, and increasing the number employed in shipbuilding by 450. The extent to which the reduction in the cost of maintenance was proposed to be carried under the new arrangements may be readily understood from a comparison of the numbers

Repairs to
ships

allotted to this branch of dockyard work in 1869-70 with the corresponding numbers in previous years. The figures are as follows : 1869-70, for repairs, 8,243 men ; 1868-69, for repairs, 9,833 men ; 1867-68, for repairs, 8,296 men ; 1866-67, for repairs, 11,936 men.

Policy
of Mr.
Childers

The policy of retrenchment in the expenditure on repairs combined with an increase in the construction of new tonnage, as proposed by Sir Spencer Robinson, was resolutely adopted by Mr. Childers : and notwithstanding the great diminution in the number of men employed, he succeeded in 1870-71 in completing 9,567 tons weight of ironclad construction in the dockyards.

It cannot be denied that these results were attained by a restriction of the appropriation for repairs which has not been warranted by increased experience in the wear and tear of an ironclad fleet. Iron hulls, when properly cared for, possess great durability ; but boilers deteriorate rapidly, and considerable sums are constantly being expended in alterations in the rig, the armament, and the fighting equipment.

Sir Spencer
Robinson's report
in 1870

The first note of alarm was sounded by Sir Spencer Robinson himself, in a paper dated August 4, 1870, only seven months after he had expressed his approval of great economies in the expenditure on repairs. Reviewing the condition of the Navy, and the state of preparation for contingencies which might possibly arise out of the Franco-German war, he reports that, of 39 ironclads in the hands of the Navy only 22 were available for general service, and that six special ships were similarly available for special service. He considered that the provision in the dockyards was insufficient for secure neutrality, and that any delay in making further preparation was fraught with danger to the country.

No time was lost by Mr. Childers in giving effect to

the urgent recommendations of his responsible professional adviser, and, a vote of two millions having been taken for additional armaments, a sum of half a million was applied by a Board minute of August 9 to the completion of the repairs of ironclads, expediting the 'Thunderer' and the 'Dreadnought,' and the payment of the first instalments on the four armoured vessels of the 'Cyclops' class. In the Estimates for the following year, provision was made for 12,850 men, being an addition of 1,574 to the numbers voted in the previous year, which had been cordially accepted by Sir Spencer Robinson as sufficient for the wants of the Navy. In the interval, however, he had been brought face to face with the stern possibility of a European war, and his views as to the requirements of the Navy had been so completely changed by the altered circumstances that he thought it his duty, in a confidential paper of January 13, 1871, to make a formal representation to Sir Sydney Dacres that 13,500 artificers was the lowest number which would suffice, and that, even with that very considerable augmentation, the necessary work would be stinted and starved. In the paper in question he expressed his conviction that Mr. Childers, whose health had given way from overwork in the Public Service, would have approved the proposed addition to the strength of the dockyards. No difficulty, however, was experienced with Mr. Goschen. In the first estimate prepared under his supervision, the number of workmen was raised to the standard which Sir Spencer Robinson had insisted upon, and in the following year a further addition was made of 1,380 men to the strength of the dockyards.

Additional
expenditure
approved

Numbers of
artificers
required

The increase in dockyard expenditure, which it had been found impossible to prevent even under the

Dockyard
expenditure

vigorous control of Mr. Childers and Mr. Goschen, was continued for the first two years after the accession of the present Administration to power. It reached its culminating point in 1875-76, when the vote for wages amounted to 1,025,477*l.*, being an increase of 394,074*l.* as compared with the year 1870-71. No material reduction has been made in the interval, and the increased expenditure has been mainly devoted to the repair and maintenance of the fleet. In 1875-76 the armoured construction was only 10,641 tons as compared with 9,567 tons in 1870-71, and the unarmoured construction fell away from 3,942 to 3,516 tons.

Reductions
due to
inexper-
ience with
ironclads

It is impossible to conclude this review of recent dockyard administration without acknowledging the efforts of the eminent public servants who have followed one another at the Admiralty to protect the interests of the taxpayers ; but when it is attempted to make political capital out of the alleged neglect of a Liberal Ministry to maintain the fleet in a condition for active service, it is the duty of impartial and attentive spectators to remind the public that the reductions in the dockyards were due, not to a desire to stint the Navy, but to inexperience in the wear and tear of ironclad ships. The policy of Mr. Childers was not merely approved, but suggested by Sir Spencer Robinson. In the early years of the Liberal Administration the appropriations for the maintenance of the fleet were inadequate ; but the subsequent increase in the aggregate expenditure, almost the whole of which has been absorbed in repairs, must have been watched with the deepest concern by all who desire that the power and efficiency of the Navy should grow in proportion to its cost.

Between 1874 and 1879 thirteen ironclads, with a

total displacement of 101,252 tons, were launched from the English dockyards. In the same interval the French launched 65,775, and the Germans 36,577 tons of armoured ships. The list of armoured ships in construction in the French dockyards, as given in the last issue of the 'Année Maritime,' included five first-class and seven second-class ships, and six first-class and two second-class coast-defence vessels. In the German dockyards three armoured ships of the 'Sachsen' type, of 7,400 tons, and eight armoured gunboats of the 'Wespe' type, of 1,000 tons, are in various stages of progress. Ironclad ships are now being built in the German and the French dockyards at least as rapidly as we are building for our own Navy, and from a naval point of view it is perhaps satisfactory to be assured that the formidable fleets now building for the most ambitious maritime Powers on the Continent are not likely to be combined against us.

Naval
construc-
tion—
English,
French,
German

The annexed table is taken from the Navy Estimates, and from a return of tonnage built, which was obtained by Mr. Shaw-Lefevre.

Building
return

DOCKYARDS.

Year	Artificers	Wages £	Tons Weight of Hull actually built	
			Ironclads, Tons	Unarmoured Tons
1870-1	11,276	631,403	9,567	3,942
1871-2	12,850	706,538	6,261	7,167
1872-3	12,858	712,571	5,789	6,632
1873-4	13,500	841,658	5,003	6,317
1874-5	15,120	967,214	7,916	3,388
1875-6	16,000	1,025,477	10,641	3,516
1876-7	16,109	1,015,947	7,920	5,517
1877-8	16,109	1,014,829	5,940	6,112
1878-9	17,565	1,015,102	6,912	4,817
			To be built	
1879-80	16,111	1,012,038	7,493	4,658

24 Park Lane, April 6, 1880.

I.

G

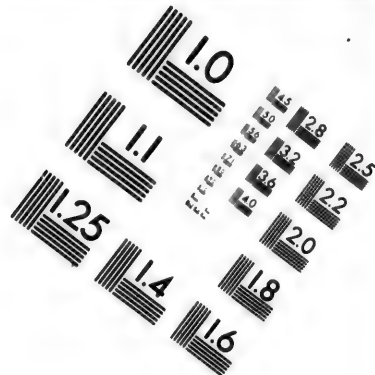
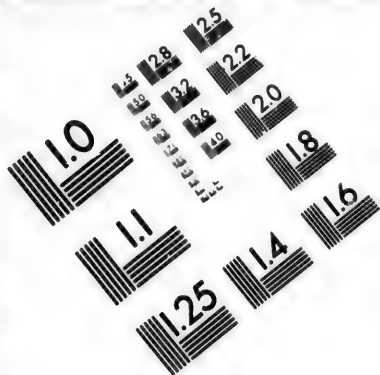
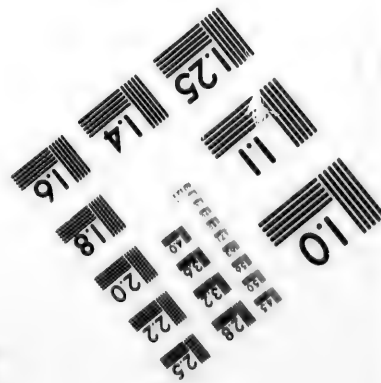
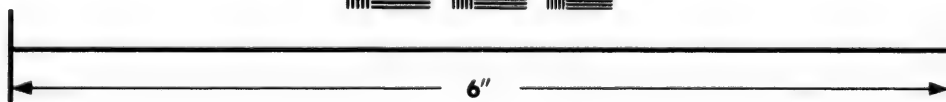
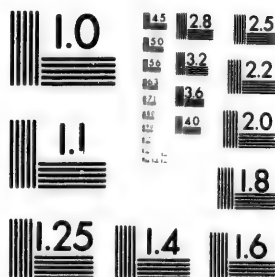


IMAGE EVALUATION TEST TARGET (MT-3)



Photographic
Sciences
Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

18
20
22
25
28
32
36
40
44
48

10
11

IX

EGYPT AND THE SUEZ CANAL

ADDRESS DELIVERED AT THE SHEFFIELD CUTLERS' FEAST,
SEPTEMBER 7, 1882

It is the admitted duty of every Government to maintain our naval supremacy, and the operations in which the fleet has been recently engaged afford evidence of the pains which have been taken through the long interval of peace to maintain the efficiency of the Navy. More than a quarter of a century has elapsed since the fleet went in to bombard the forts at the entrance of Sebastopol. Our experience in the Russian war led to a revolution in naval architecture, and the treasure of the nation was poured out profusely in the construction of a fleet of ironclads. It is satisfactory to know that the efforts we have put forth in the construction of these mighty engines of war have not been exerted in vain. In the recent bombardment of Alexandria the armour with which the vitals of our ships were protected, though struck in many places, proved an effective defence, and the guns and the elaborate mechanism for working them endured the strain of the protracted engagement without a failure of importance. If I speak thus favourably of the results of our experience at Alexandria, let it not be supposed that the Admiralty will desist from their efforts to perfect the armaments and the construction of our ships. On the contrary,

Bombard-
ment of
Alexandria

they will be eager to profit by any suggestions for improvement which might be sent them from the fleet.

Turning from the ships to the *personnel* of the Navy, it is certain that the seamen of the present day have never been surpassed. Our naval officers and seamen are as skilful as they are brave. For promptitude of action, for power of combination, for skill in the appropriate use of every description of force at the disposal of the naval commander, nothing could excel the simultaneous occupation of the Suez Canal and the removal by sea of the Army from Alexandria to Ismailia. The responsibilities of the Navy did not cease with the landing of the Army in Egypt. The fleet continued the base of operations. Our ships were an integral part of the garrison of Alexandria, and they held the Suez Canal. Our seamen have been co-operating with indomitable energy to forward supplies to the Army, and a force of seamen will strengthen the artillery under Sir Garnet Wolseley. At Ramleh, and throughout the advance from Ismailia, the Marines and Marine Artillery held an honourable place in the van of the Army, and the feeling of satisfaction is universal that this valuable corps has had an opportunity of showing its capabilities.

Good work
of Navy
in Egypt

The observations I have ventured to offer on the military operations in Egypt would be incomplete without a brief reference to the general question of our communications with the East by the Suez Canal. In a military point of view I do not attach a high importance to the Suez Canal. As a member of the Select Committee of the House of Commons on the project for the Euphrates Valley Railway, I had an opportunity of hearing the views of Lord Sandhurst and of many other witnesses of high authority. At the time when we were almost overwhelmed by the Mutiny in India, the

The Suez
Canal

The Canal
and Cape
routes

Advantage
to com-
merce of
the Canal

difficulty lay, not in bringing reinforcements from England, but in sending our troops up country by toilsome marches, occupying many weeks. By the completion of the network of railway we are securing ourselves against a recurrence of the difficulties of internal communication. Lord Sandhurst considered it imperative that we should maintain a sufficient force of British troops in India to keep down any local insurrectionary movement, and with this necessary precaution he attached little importance to the delay of a few days in the arrival of troops from England. In comparing the voyage by the Canal with the voyage round the Cape in the powerful transports which might be employed on that service, the difference in time was less than a week. The route by the Cape was more easily defended, and the troops would escape the sufferings from heat which were experienced during a great portion of the year in the Red Sea. It is when we turn from military to commercial considerations that communication by the Canal assumes a paramount importance. In the continuous interchange of commerce the saving of many days on every voyage represents an economy in the cost of transit between England and the East of stupendous magnitude. The Canal is a means of economy not only in saving of time, but because the route is practicable for steamers of a far less powerful and less costly type than would be required for the more exposed and extended navigation round the Cape. The Canal trade is within the reach of shipowners of moderate resources, and by their combined efforts has received a development which would never have been attained if it had remained a monopoly in the hands of a few powerful combinations. On the diplomatic situation I need not dwell. The diplomatic difficulties in the adjustment of the Egyptian

question will be great, and they will be best overcome by showing ourselves strong in arms and magnanimous in council. As to our Irish policy, it is my personal conviction that in the embittered relations between landlord and tenant in Ireland, the intervention of the State to arbitrate on the value of land has become a necessity. I cherish the hope that the Government and the House of Commons have not been labouring in vain, and that as the result of recent legislation a sensible improvement has taken place both in the payment of rents and the diminution of crime. From errors of judgment they could not be wholly exempt, but I claim for Her Majesty's Ministers that they have striven to the best of their ability to merit the approval of their country.

X

NAVAL SHIPBUILDING

ADDRESS DELIVERED AT BIRKENHEAD, DECEMBER 12, 1882

COMING before you in the capacity of Civil Lord of the Admiralty, and addressing a meeting in the busiest seaport of the world, I may assume it to be your wish that I should give you some information relating to the Navy. Their conspicuous services in Egyptian waters have raised our seamen, always so popular, still higher in the public regard ; and some share of credit may doubtless be claimed for the civil administration of the Navy. But I desire to say that no part of that credit should be given to those subordinate Parliamentary officials who are responsible for the finance of the department. We can do a great deal to injure the Navy, and we can do something to improve it ; but when the occasion arises for the active employment of our forces, the First Lord of the Admiralty and his naval advisers have an undivided responsibility. It is to them, therefore, that the gratitude of the country is due for the able management of the fleet throughout the Egyptian campaign.

Value of
mercantile
marine

When speaking in this neighbourhood on former occasions I have always insisted on the intimate connection between the fighting Navy and the mercantile marine. Your shipbuilding yards may be regarded as so many supplementary dockyards ; your powerful

steamers become transports or cruisers ; your seamen and engineers are an inexhaustible reserve for manning the Navy. Unless we could rely on the mercantile marine to help us, it would be impossible to accept the responsibility of protecting our commerce with the present Estimates, or indeed with any Estimates which Parliament could be induced to vote. In the recent war our resources were conspicuously illustrated. In a little more than a month 46,472 officers and men, and 17,522 horses and mules were transported from various parts of the Mediterranean, from England, and from India, to the coasts of Egypt. The rapidity of this movement is unexampled in the history of war, and it contributed in no small degree to the success of the campaign.

Passing on to the general course of our naval administration, our main object has been to utilise to the utmost the money confided to us by Parliament. We have sought by every means to concentrate our efforts on the development of the essential elements of naval power. The result may be appreciated by the aid of a few statistics. Eliminating the transport vote, and the vote of 2,000,000*l.* for pensions, the expenditure in 1879-80 was 8,196,000*l.*, and the shipbuilding, expressed in tons weight of hull, was—ironclads, 7,427 tons ; unarmoured, 7,800 tons. In 1832-83 the expenditure is 8,289,000*l.*, while the armoured construction is raised to 11,466 tons, and the unarmoured to 8,675 tons. These figures will show you that with an addition of only 93,000*l.* to the expenditure, we have added no less than 4,000 tons to the armoured and nearly 900 tons to the unarmoured building. This most satisfactory result has not been brought about by encroaching on votes which contribute to the main strength of the Navy. In the present year we have reduced the Marines from 13,000

Naval
expenditure

Improvements to
personnel

to 12,400 ; but we have provided for 240 more seamen and boys. We have improved the pay of the officers and non-commissioned officers of Marines, and we have increased the gunnery pay of all those who qualify as trained men. Repairs have not been neglected, but they are becoming less costly. New regulations have been issued, based largely on the experience of the mercantile marine, and they have had the desired effect of extending the boiler endurance in the Navy. We are beginning to realise the advantage of the composite construction in the increased durability of our unarmoured ships. For the reduction in the cost of repairs to ironclads we are indebted to our predecessors.

Ship-
building
designs

Passing from the amount of shipbuilding in progress to the subject of designs, we have hitherto steadily resisted the demand for increased dimensions which was fostered by a spirit of rivalry with the Italian constructors. We are not insensible to the advantage of superior speed, heavy guns, and thick armour, but we object to the concentration of our whole power on a few colossal ships, which cannot, by the utmost exaggeration of size and cost, be made secure against the risks of navigation and battle. We have, therefore, thought it wise to rest content with the fighting qualities which the constructors have been able to give us in the 'Collingwood.' The ships of this type are protected with 18-inch steel-faced armour ; they carry four 60-ton guns in two barbette towers ; they steam 15 knots, and with forced draught 16 knots ; their displacement is 9,600 tons and the cost 540,000*l*. The displacement of the 'Inflexible' is 11,880 tons, the cost 800,000*l*., and the speed 13½ knots ; the armour is 24-inch, and the armament includes four 80-ton guns. These advantages over the 'Rodney' and 'Collingwood' are, in our judg-

'Admiral'
class

ment, dearly bought by the immense increase of cost. With an equal expenditure, five 'Rodneys' could be pitted against three 'Inflexibles.' We have already laid down four ships of the 'Collingwood' type. We have pursued a similar policy in the construction of the unarmoured vessels. We have recognised the necessity of adding fast ships to the fleet, and have laid down five 16-knot ships of the 'Leander' type. We have not thought it wise to repeat the 'Iris' type, believing that the gain of two knots in speed is too dearly purchased by an increase in cost from 160,000*l.* to 214,000*l.* In addition to the 'Leanders,' we have laid down two armoured cruisers, which will have an equal speed, and will be able to combine with the protection of commerce a marked superiority in fighting power. The last additions to our programme were vessels approaching the 'Leanders' in speed and dimensions, specially designed to carry an armament of heavy guns or torpedoes. For the police of the seas we have adopted a type of which we are now building no less than seven, with a displacement of 1,420 tons.

Swift
cruisers
building

I have, perhaps, detained you too long with naval details, and will conclude with a few observations of a more general character. It is now more than twenty-one years since I appeared at Birkenhead—a young and untried man—as the first champion of the Liberal cause in your then newly enfranchised borough. With the lapse of time and wider experience, my early political convictions have been strengthened and confirmed. The necessity for concessions to popular demands must be accepted by every Government. The Liberals advocate reforms with confidence in the result; the Conservative Reform Bill was introduced to Parliament as a leap in the dark.

Political
convictions

Work of
Liberal
party

In a recent contribution to the 'Fortnightly Review,' by two able Conservatives, the selfishness of their party in domestic legislation is severely stigmatised. We may give our assent to these criticisms, but we draw the inference that politicians who feel the generous sentiments expressed by the two Conservatives can only act with consistency in the ranks of the Liberal party. Cynical critics question the sincerity of our professions. To quote a phrase from the 'Vicar of Wakefield,' they think that no man is so fond of liberty himself as not to be desirous of subjecting the wills of some individuals to his own. Arguing, however, from a strictly Conservative point of view, I would ask whether any of the great interests which that party has undertaken to defend have been injured by modern legislation. Has the Church been injured by the abolition of compulsory church-rates, or by the passing of the Burials Bill? Have we fallen in the esteem of nations by submitting our case to the Geneva arbitration? Is the Army less efficient through the abolition of purchase, or the introduction of short service? Has any social or political convulsion followed on the Reform Bill, the Ballot Act, the abolition of university tests, or the extension of elementary education? If there is any hope of a settled government in Ireland, is it not by the remedy of abuses in combination with such measures of repression as may be necessary for the maintenance of order? Have not all these reforms been followed in the main by the happiest results, and ought we not to be thankful that society is on the whole progressive? To those who, in spite of experience, are still apprehensive of concessions to English democracy, it may be pointed out that our working men are divided in their political sympathies. They do not, as Mr. Escott has remarked, unite as a class against their employers, or

attempt to fashion their future by themselves alone. The political and powerful classes do not, as in France, keep themselves aloof from the working classes. The old Whigs have set a good example to the classes to which I belong by the breadth and wisdom of their political sympathies. It is well for the country that their example has found so many imitators. The legislation demanded by the British workman is distinguished for reasonableness and moderation ; and that opinion is abundantly sustained by the parliamentary programme from time to time brought forward at the congresses of the trades unions. When the present Government came into office the most prominent demands were amendment of the law of compensation in cases of accidents, amendment and consolidation of the laws relating to factories and workshops, extension of the Employers and Workmen Act of 1875 to English seamen in British waters, codification of the criminal laws, abolition of imprisonment for debt, and the reform of the patent laws. The present Government has already dealt with several of these questions, and during the ensuing session the Grand Committees will probably be engaged on the criminal law, bankruptcy, and the patent laws. Legislation on these subjects will probably be facilitated by the new rules of procedure recently carried through the House of Commons by the energy of Mr. Gladstone. For the chief direction of affairs both at home and abroad let us be thankful that we enjoy the inestimable advantage of his leadership. Few British statesmen have enjoyed political supremacy so long ; none have used it for nobler objects. In the comparatively brief career to which most public men look forward, and with an almost painful consciousness of inferiority of capacity, the example of such a leader may seem too lofty for imitation ; but it would be

Demands of
British
workmen

Mr. Glad-
stone

an unworthy weakness to abandon the effort. It is well said by the accomplished poet who now represents the United States in London—

Greatly begin. Though thou hast time
But for a line, be that sublime ;
Not failure, but low aim is crime.

This is a true and noble maxim. May it ever guide the Liberal party.

XI

THE NAVY

SPEECH IN THE HOUSE OF COMMONS, MAY 7, 1883

SIR T. BRASSEY said it was unfortunate that the discussion of naval questions should so frequently land us in what seemed to be a hopeless controversy. There was one observation in which all would agree, and it was that the responsibility for the general position of this country as a naval power must be shared by a long succession of administrations. If we were deficient in strength, which he did not admit, in spite of the large additions we had made to the expenditure and the rate of construction, the blame would rest with preceding administrations.

The committee had received some extremely unfavourable opinions as to the state of the Navy, and he desired to interpose at the present stage of the debate for the purpose of pointing out how the fleets of other Powers had been exaggerated and our own unfairly depreciated. Ships had been included as complete which were still in hand, and in some cases in a backward condition. It was assumed that all foreign ships were armed with the armaments proposed for them, although in several cases they carried guns inferior in power to those for which the ships were designed—an alternative to which we had never been reduced in this country. Delays in completion had been criticised as

Unfair
criticisms
on Navy

peculiar characteristics of British naval administration, although a careful examination of the foreign estimates for a series of years would show that the disappointments we had felt at the increase, both of time and money, required to bring a modern ironclad to completion, had been experienced equally in France and Italy. Comparisons were made of mere numbers without reference to relative fighting efficiency. Thicknesses of armour were compared without reference to the area protected ; although, in the one case, protection might be confined to a narrow and tapering belt at the water line, and in the other might be extended over a roomy citadel. Differences of coal-supply were ignored, although, in arguing with his naval colleagues for restricted dimensions, coal endurance was a quality on which they insisted most strongly.

Comparison of
English
and French
navies

As a broad principle, displacement was the fairest measure of the relative power of contemporary ships. Displacement represented so much weight of armour, armament, machinery, fuel, or hull. The relative proportions assigned to each might vary according to the qualities insisted upon in the particular types, but we might assume for the able constructors of the chief navies of Europe equality of skill in the utilisation of tonnage. A careful comparison made on this basis of the ships actually ready for sea at the present time and as far forward as it is necessary that we should look, would show that we held a commanding position. We were especially strong in first-class ironclads of the newest type, but our superiority in the older types should not be disregarded. With improved machinery they might be made highly effective for the protection of commerce. With these explanations he would compare the French and English armoured fleets. The

comparisons would be confined to ships actually ready for sea in 1882 and 1885 respectively, and built either of iron or steel, or of wood, launched subsequently to 1867. Older ships of wood were excluded, it having been stated by the committee on the French estimates for 1881 that the life of a wood-built ironclad should be reckoned at fifteen, or at most sixteen years. Grouping together in the first-class ships with armour of not less than nine inches, and a displacement exceeding 8,500 tons, we had, in 1882, ten ships aggregating 96,000 tons; the French, three ships of 22,000 tons. In 1885 we should have fifteen ships of 140,000 tons; the French, six ships of 61,000 tons. Taking for the second-class ships protected with armour exceeding eight inches, and displacements under 8,500 tons, we had, in 1882, thirteen ships of 80,000 tons; the French, seven ships of 56,000 tons. In 1885 we should have sixteen ships of 101,000 tons, and the French thirteen ships of 93,000 tons. In a third class, consisting of ships with four and a half to six inches of armour, and without limit as to displacement, we had, in 1882, thirteen ships of 104,000 tons; the French, twelve ships of 50,000 tons. In 1885 we should have twelve ships of 98,000 tons; the French, five ships of 24,000 tons. For coast defence, we had, in 1882, eight ships of 28,000 tons; the French, fourteen ships of 37,000 tons. In 1885 we should remain as at present, while the French would have increased to nine ships of 41,000 tons. In this comparison, vessels for colonial defence, and the 'Viper,' 'Vixen,' and 'Waterwitch,' were omitted on our side. On the French, seven floating batteries and the 'Onondaga' were excluded.

The committee and the country should be reassured by this statement. It had been compared with the

Increase
of French
naval ex-
penditure

French estimates for 1884, and embraced every ship which could possibly be ready for sea in 1885, including the 'Admiral Baudin,' of 11,160 tons. It was admitted that of late the French had made great efforts to strengthen their navy, but their expenditure had remained almost stationary in the last three years, while our shipbuilding votes had been increased from 3,123,000*l.* in 1880-81 to 3,754,000*l.* for 1883-84. The armoured building had been raised from 10,816 to 13,206 tons, and the number of men employed in repairs from 5,000 to 6,528. Hon. members opposite might think that the Admiralty should have done more; they had proceeded with deliberation because they knew that their position was secure, and they were seeking by every means in their power to make a more effective application of the amounts already at their disposal rather than propose to Parliament an unnecessary increase in the Estimates.

Naval
construc-
tion

It was impossible to do much to reduce the cost of repairs. A material improvement was practicable in the application of the money devoted to shipbuilding. Powerful seagoing vessels would always occupy the first place in the service, but the expenditure should not be unduly concentrated on the large battle-ships. They should be supported by swift auxiliaries, protected as regards buoyancy, and armed with guns of light or medium calibre. Those vessels would both combine with the ironclads in battle and also protect our commerce. The new type was represented by the 'Mersey' and 'Severn.' The Admiralty would lay down two more vessels of this type, without adding to the Estimates, by introducing them into the programme of next year, in succession to the large corvettes, the 'Caliope' and 'Calypso,' now rapidly approaching completion. Torpedo

vessels are scarcely inferior in importance to the fast cruisers. A combined attack by numerous torpedo vessels would be formidable, perhaps fatal, to the most powerful ironclad. Torpedo vessels were being built largely for all the navies of Europe. The provision in the present Estimates had been kept within narrow limits. The completion of six gun vessels included in the contract vote will set free a considerable sum which could be applied with great advantage in increasing our flotilla of seagoing torpedo vessels. Ships capable of cruising under canvas were indispensable for the training of seamen. There was a large reserve of vessels of this class. It would be enough, therefore, to replace the tonnage which fell out; and the composite construction had greatly tended to increase the durability of the fleet. Behind the fleet were the great resources afforded by the mercantile marine. The mercantile auxiliaries could not be regarded as fighting ships, but they were effective for the protection of commerce. Foreign Powers gave liberal subsidies to encourage the construction of ocean steamers, few in number as compared with those on the Admiralty List constructed by private enterprise without the aid of the Government. The relative fighting efficiency of the Navy might be raised, without adding to the expenditure, by superior skill on the part of our naval architects. That superiority had been contested in some of the speeches which he had heard that evening. If he compared our fleet with those of other Powers, he confidently maintained that the comparison did infinite credit to the naval administrators of past days, more especially with reference to the small proportion of obsolete ships. In our later unarmoured ships a deficiency of speed, due to unnecessary restrictions as to length, might be regretted. The ships now building and completing,

Seagoing
torpedo
vessels

Protection
of com-
merce

Speed of
ships

whether armoured or unarmoured, showed a remarkable advance in speed, and, as a fleet, were unrivalled in this important quality. In the shipbuilding history of the year the speed of $15\frac{1}{2}$ knots attained in the recent trial of the 'Conqueror' was a notable triumph, and a considerably higher speed was expected in the ironclads now in construction. All would have a speed, it was hoped, of 16 knots. The two ships of the 'Mersey' type would steam 17 knots. The five protected ships of the 'Leander' type would steam 16 knots, and when the power of using forced draughts was added, 17 knots might be expected. No fewer than 15 vessels in construction were capable of steaming 16 upwards to 17 knots. In general fighting efficiency no ships of equal tonnage which were building for foreign navies were, in his judgment, equal to the 'Collingwood' and the later improvements of the same type which are now building, whether in respect of the speed, the armour, the protection, the buoyancy, or the armament. The Admiralty were most ready to improve. As at present advised, they were satisfied with this type, and by repeating it, rather than by insisting on a constant change of type, it was possible to build much faster and at a considerable reduction of expense. Having indicated the means by which our fighting strength might be raised without adding to the shipbuilding votes, he would leave the question of a future addition to those votes for the consideration of the Government. The decision must depend upon proceedings elsewhere, which the Admiralty could neither foretell nor control. If the expenditure had increased, if it should be increased in the future, the country had been following and not leading in a rivalry which it could not but regret. The present Board had taken the measures which were necessary in the circumstances, and asked for the confidence of Parliament in the future.

'Collingwood' type

XII

NAVAL CONSTRUCTION

DELIVERED TO THE PORTSMOUTH LIBERAL ASSOCIATION,
AUGUST 12, 1884

In any statement with respect to the Navy, comparisons of strength afford a topic of the greatest interest to the public. Avoiding details, and taking displacement as the fairest measure of their relative power, the aggregate tonnage of the effective armoured fleets of the leading Naval Powers of Europe may be summarised as follows :

	Displacement (Tons)	Armoured tonnage of Europe
England	329,520	
France	201,789	
Germany	96,800	
Austria	56,400	
Russia	98,000	
Italy	68,000	

In this computation it is to be observed that those ships only are included which are actually ready or have been ready for sea. It seems superfluous to point out that, when ships building or projected are included in the same list with those actually completed, an unfair advantage is given to an Administration which has many ships in construction, advancing slowly to completion, over one which pursues the wiser course of having few ships in hand, and pushing them on with vigour.

Naval expenditure

While offering to the public a satisfactory statement as to the actual condition of the fleet, it is not disputed that great exertions are being made by the French. When the present Board came into office, the annual expenditure of the French on ironclad construction was largely in excess of the outlay in this country. That was a condition in which we could not acquiesce, and in three years, under an Administration pledged to economy, we have added no less than 1,000,000*l.* to the effective votes for the Navy. The shipbuilding expenditure was increased from 3,106,000*l.* for 1879-80 to 3,889,688*l.* in 1883-84, and 3,891,000*l.* for 1884-85. The number of workmen employed in the dockyards at home has been increased from 16,381 to 18,849. The armoured building has been advanced from 7,427 tons in 1879-80 to 12,614 tons, as proposed in the Estimates for 1884-85. The expenditure on armoured building for 1883-84 and 1884-85 has been actually doubled as compared with 1879-80.

Comparative cost of English and French construction

The relative progress of construction in France and England may be measured with tolerable accuracy by a comparison of the sums voted for shipbuilding. It may seem difficult to reconcile this statement with the marked difference in the rate of wages in the French and English dockyards. A comparison of French and English completed ships will show that the differences of cost are not important. The following are examples :

{ Amiral Duperré	10,487 tons ;	cost of hull	£460,000
{ Dreadnought	. 10,800 "	" "	493,035
{ Dévastation	. . 9,639 "	" "	312,000
{ Thunderer	. . 9,330 "	" "	306,430
{ Redoutable	. . 8,858 "	" "	356,000
{ Ajax	. . . 8,510 "	" "	392,000

M. Dislère, an eminent French constructor, in a

published essay, has given the results of a minute comparison of every element of cost in the French and English yards. He remarks that, while the daily wages in the English yards average 5s. 1d., and in the French yards 2s. 2d., the annual cost of repairs per ton of displacement is in England 1l. 19s. 2d., and France 1l. 17s. 1d.

In his solicitude for the efficiency of the Navy, Sir Thomas Symonds has been betrayed into inaccuracies of statement, with reference not only to the strength in ships ready for sea, but also with reference to the comparative expenditure in building. In his letter of the 19th April last, he gave the French estimated expenditure on armoured building for 1885 correctly at 1,025,360l. He was in error in his English figures, which he understated at 912,455l., the correct amount being 1,232,900l. He was equally in error as to the total of the effective naval votes, which he put at 7,900,000l. for France, and 8,600,000l. for England. The true figures were, for 1883-84: England, 8,915,000l.; France, 7,508,700l.; and for 1884-85: England, 8,897,000l.; and France, 7,258,000l.

Sir Thomas
Symonds

It might be thought that with this difference of expenditure a more decided supremacy should have been secured. The British Naval Administration is charged with far heavier responsibilities than the French. For the protection of our vast commerce in every part of the globe we maintain a fleet in commission with an aggregate displacement of 324,256 tons as compared with 171,300 tons for the French. Our fleet in commission is nearly double the tonnage of the French, while our mercantile marine is tenfold larger.

British
responsi-
bilities

Our ships in commission are doing good service, not only in the protection of commerce, but in the training

of the Navy. The training which makes men sailors can only be gained at sea, and the large proportion of our officers and men afloat—so much larger than that of any other Navy—gives us an advantage which cannot be too highly valued. Nothing would be more prejudicial to the efficiency of the Navy than to seek to cut down expenses by reducing the number of our seagoing ships. Anxious as we are to concentrate expenditure on building we have not attempted to cut down the necessary expenditure for maintenance and repair.

Types of
ships

Having given these details as to the growth of expenditure and the amount of construction in progress, I will proceed to offer some observations with reference to the types of the ships laid down under the present Administration. The cost of shipbuilding shows a constant tendency to increase, and we have endeavoured to meet it by every means in our power. With this view, while carefully considering every suggestion for improvement, we have avoided as far as possible those repeated changes of design, which can only be justified by the promise of a substantial gain in efficiency. The programme for 1884-85 consists for the most part of types well known in the dockyards. Four types only are represented in the eleven ironclads actually in progress.

Ironclad
construction

For the first class we have six ships of the 'Admiral' type. In this type the two independent armoured citadels, the mounting of the heavy armament in barbette, and the decided advance in speed, are the prominent features of novelty. For the second class we have in the 'Hero' a repetition of the 'Conqueror.' The 'Warspite' and 'Imperieuse' were specially designed for distant foreign service. The 'Colossus' and 'Edinburgh' were laid down under the late Board, and repre-

sent a reduced copy of the 'Inflexible.' In the quality of speed our ironclads in construction are superior to the early types in our own service, and to any contemporary ships of similar displacement. All the first-class ships have a designed speed of at least 16 knots, and the speed of the 'Conquerors' is only a fraction below that of the larger ships. It has been the policy of the Board to keep the displacement of our largest ships at a maximum of 10,000 tons. Within these limits we can secure a speed of 16 knots, an armament of the heaviest guns, and armour of 18 inches in vital places. If it were required to combine equal armour and armament with a speed increased to 18 knots, we must accept the dimensions of the 'Italia' and 'Lepanto,' and be prepared to build ships of 14,000 tons at a cost of 1,000,000*l.* each. We are not prepared to adopt a policy involving such serious consequences in lowering the numerical strength of the Navy.

Sir Thomas Symonds condemns our shipbuilding policy, not only for the insufficiency of the tonnage, but for the inferiority of the designs. It is not possible to discuss the defects of the types in favour elsewhere. It will be sufficient to say that, while recognising in the French ships the same perfection of model which was so remarkable in their wooden ships of former days, I have the fullest confidence in the ability of our own constructors to give us battleships which, ton for ton, would be at least equal to the most powerful ships in any foreign navy. If the French give more protection by armour to the water-line, we give more protection to the guns. The experience of battle can alone determine which of these dispositions is the best. In contemporary ships of similar displacement there is no appreciable difference as between the French and ourselves in

Designs

the average thickness of armour, and the average weight of the armaments of the ships.

Unarmoured
construction

Turning to the unarmoured construction, it is not sufficiently understood by the public how large a proportion of the money spent on shipbuilding is devoted to those unarmoured ships, which are totally disregarded in the comparisons of strength lately given to the public. In the thirteen years 1872-85 the expenditure on unarmoured vessels—hulls only—was no less than 7,305,432*l.* as against 9,762,681*l.* expended on armoured ships. In the extent of our unarmoured construction we are immensely ahead of the French. The public will be surprised to learn that the figures for the French Navy, corresponding to those already given for the British, were: armoured ships, 8,350,375*l.*; unarmoured, 3,007,521*l.* As regards the tonnage to be built, we propose to build in 1884-85, 8,065 tons, or 1,500 tons more than last year, and an amount appreciably in excess of the average of the last six years.

Types
of unarmoured
ships

In the types of our unarmoured ships great improvements have recently been effected. The vessels built in succession to the 'Inconstant' and 'Volage' were, in many cases, inferior in speed to their predecessors. It has been the special aim of the present Board to make good the deficiency in fast unarmoured ships. The programme for 1880-81 included only three vessels, the first examples of the 'Leander' type, with a speed of more than 13 knots. The present unarmoured programme includes, in various stages of advancement, four vessels of 17 knots, seven of 16 knots, and four of 14 knots. The speeds have been increased in the larger types from 13 to 17 knots; in the corvettes and sloops from 10 to 13 knots; and in the gunboats from 10 to 14 knots. We have made a decided advance not only

in speed, but in protection and armament. In the protection for buoyancy our later ships may be considered equal to the largest of the new Italian ironclads. The 'Leanders' and the 'Merseys' are protected by a 3-inch steel deck, and fitted with an armoured conning-tower. While giving special attention to the protected cruisers, we are not neglecting the construction of torpedo vessels. We have introduced into our programme a seagoing torpedo vessel, the 'Scout,' of a much more powerful type than any we have yet built, and capable of cruising with the ironclads in any weather. If the type proves successful, 'Scouts' will be attached to our squadrons in considerable numbers.

The necessity for giving a rapid development to torpedo-boat construction is the more urgent now that vessels of that class have become such a prominent feature in the naval construction of other Powers. The French are expending a large sum annually on torpedo boats of a powerful class. They have entirely abandoned the attempt to carry torpedo boats on board ship. It is a circumstance of great significance that while the German Admiralty have only one ironclad in construction, they have lately obtained a vote of credit of 840,000*l.* for the construction of seventy torpedo boats for coast defence. Looking to the possibilities of torpedo warfare, it will be obvious how incomplete are those comparisons lately presented to the public, in which the relative strength of the armoured fleets is accepted as the only test. In the smoke and confusion of an engagement, the simultaneous attack of a cloud of torpedo boats advancing at 20 knots, armed with Whiteheads, and commanded by determined men, would be most formidable. The torpedo boat is a naval arm, for the rapid construction of which the industrial

Torpedo
flotilla

capacity of this country would give us a great advantage, and it is a weapon well adapted to the fearless and skilful seamen the British Navy has never failed to produce.

Expendi-
ture on
works

Turning to the votes for which the Civil Lord is more particularly responsible, the charge for works under Vote 11 has been reduced from an average of 741,000*l.* for 1866-71 to 386,300*l.* for 1884-85. This reduction has been rendered possible by the near approach to completion of the extension works in the home yards. Portsmouth and Chatham are still incomplete, and require for the year 1884-85 an outlay of 17,000*l.* A further sum of 36,000*l.* is taken for the large graving-dock in construction at Haulbowline. In addition to these charges for the extension of our dock accommodation at home, we have to meet an annual charge of 160,000*l.* for the maintenance of our docks and naval establishments both at home and abroad. Regarded as a percentage upon the total valuation of the Admiralty buildings, estimated at 16,000,000*l.*, the cost of maintenance cannot be considered extravagant. The sum available being thus reduced to 150,000*l.*, satisfactory progress on new works of magnitude can only be secured by close concentration of expenditure. Our main attention is now being directed to the completion of the barracks at Keyham and the shipbuilding shop at Malta. Additional dock accommodation is gradually being provided at important foreign stations. A private company has offered to build at Hong Kong a dock capable of receiving ironclads, and we have obtained the sanction of the Treasury for a loan to the company of 20,000*l.* and a free gift of 25,000*l.* A dock, constructed by the Colonial Government, has recently been completed at the Cape. The dimensions are sufficient

Docks
abroad

to admit the 'Northampton.' We are pressing upon the Government of India the important question of providing a dock at Bombay capable of receiving an iron-clad. 'Gouverner c'est prévoir ; en marine rien ne s'improvise.' These were wise maxims of the great Colbert, and to build two armoured cruisers at a cost of 900,000*l.* to protect our enormous trade with the East, and to be without the means of docking a disabled iron-clad in any port of our Indian Empire, is a condition of unpreparedness which should not be suffered to continue.

Any statement respecting the condition of the Navy would be imperfect which contained no reference to the efforts which the Australian Colonies are making to provide for their own naval defence. They are doing this, not, as I am convinced, from a desire to weaken the British connection, but in a manly spirit of independence, and from a desire to relieve the mother country of burdens which the Colonies themselves are well able to bear.

The
Colonies

As a Civil Lord of the Admiralty, it is my agreeable duty to pay a well-merited tribute of praise to the constructors, the engineers, the foremen, the leading men, and the workmen of all classes employed in the dock-yards, for the skill, the diligence, and the fidelity with which they discharge their duties. For the manning of the Navy we possess a force animated by a deep sense of its responsibility for the greatness and independence of the country. Our officers and seamen are second to none in their devotion to duty and in their general efficiency afloat. They are sustained by splendid traditions, and they have for their reward the affection and the admiration of their fellow-countrymen—the best reward which any nation can bestow on its defenders.

Tribute
to the
officers and
seamen

XIII

ENGLISH AND FRENCH SHIPBUILDING

ADDRESS DELIVERED TO THE HASTINGS LIBERAL ASSOCIATION,
OCTOBER 21, 1884

IN the recent controversies on the state of the Navy the statements which I have made from time to time on that subject have been so much disputed, and the whole administration of the Navy has been made the occasion for such serious attacks, that it is but natural that my constituents should claim from me some further explanations. The best defence that I can give is to state all the facts of the situation without reserve.

Efforts of
the Naval
Adminis-
tration

In a speech delivered at Portsmouth immediately after the prorogation of Parliament, my main object was to call attention to the efforts made under the present Administration to give a more effectual application to our naval expenditure. It was not part of my purpose to enter upon any detailed comparison of our naval strength with that of other Powers. A few figures were given to show that at the present time we occupied a strong position, but it was fully admitted that the French had been making great strides in their naval expenditure, and that the additions we had made to the expenditure on shipbuilding, though considerable, were only sufficient to bring us to a bare equality with the French in the amount of money available for the construction of battle-ships and their auxiliaries.

It is satisfactory to observe throughout all the discussions which have recently been carried on with reference to the Navy, that no disposition exists to call in question our application of the amount of money placed at our disposal by Parliament. There has been no disposition—no general disposition—to raise questions as to the types of our armoured ships, and all must admit that the remarkable additions of speed to our unarmoured vessels must tend to make our Navy more efficient for the protection of commerce.

It is with reference only to the assurances which may have been given as to the superiority of our Navy in comparison with the navy of France that our statements have been challenged. In order to put the public in a position to form a judgment for themselves on an absolute matter of fact, it will be necessary that the present statement should be more detailed than has seemed necessary on former occasions. Premising that it is chiefly as to our relative position with that of France that the public anxiety has been aroused, I will proceed to give the force available in the two navies in the present year, and, according to the best estimates which we can form, in 1886. Classification is difficult, but taking as ships of the first class those with hulls of iron, protected by a maximum thickness of armour of not less than nine inches, and with a displacement exceeding 8,500 tons, we had ready for sea when I delivered my address at Portsmouth, ten ships, including the 'Devastation,' 'Dreadnought,' 'Inflexible,' 'Neptune,' 'Thunderer,' 'Alexandra,' 'Hereules,' 'Sultan,' 'Téméraire,' and 'Superb,' with an aggregate displacement of 95,840 tons. In the same class the French had three ships—the 'Amiral Duperré,' 'Dévastation,' and 'Redoutable,' with a displacement of 28,990 tons. In 1886

Compari-
son of
English
and French
Navies

the English ships of the first class will be increased to 140,310 tons, by the addition of the 'Ajax,' 'Agamemnon,' 'Edinburgh,' 'Colossus,' and 'Collingwood.' The French will be raised to 49,070 tons by the addition of the 'Foudroyant,'¹ and 'Amiral Baudin.' Taking for the second class ships with hulls of iron or of wood—but in the latter case launched within a period of sixteen years—we have on the English side 13 ships, including the 'Monarch,' 'Audacious,' 'Belleisle,' 'Invincible,' 'Iron Duke,' 'Nelson,' 'Northampton,' 'Swiftsure,' 'Triumph,' 'Orion,' 'Shannon,' 'Hotspur,' and 'Rupert,' with an aggregate displacement of 79,740 tons. All these ships are iron built. On the French side, the second class, as already defined, includes the 'Colbert,' 'Trident,' 'Richelieu,' 'Friedland,' 'Marengo,' 'Suffren,' 'Océan,' 'Bayard,' 'Turenne,' 'Fulminant,' and 'Tonnerre,' being a total of 11 ships, and an aggregate displacement of 79,338 tons. Taking for the third class ships with hulls of iron and of wood in sound condition, and protected with armour from 4½ to 6 in. in thickness, our British list contains 14 ships, with a displacement of 112,410 tons, and the French list 12 ships with a displacement of 55,981 tons. The advantage we possess in ships of the third class is due, not to the recent construction of such ships, but to the falling out from the French list of a considerable number of their older wooden-built ships. In the earlier period of armoured construction, the French adhered to wood as the material for the hulls long after the use of that perishable material had been discontinued in the British Navy. It is the inevitable decay of their wooden-built ships which has been consistently given by the successive Ministers

Advantage
of iron over
wooden
ships

¹ Renamed 'Courbet.'—ED.

of Marine as the principal justification for the great increase of expenditure on armoured building under the French Naval Administration since the conclusion of the Franco-German war. The policy of Lord Northbrook has been framed in reliance on the assurances which have been given. My noble friend has consistently adhered to the view that the necessity for great additions to the Estimates would not arise, until it became evident that it was in the contemplation of the French Naval Administration to carry their construction of fighting ships beyond the standard of strength laid down in their latest programme of armoured building.

It may be admitted that our superiority in ships of the earlier types consists of vessels to which Older types importance cannot be given, but these ships are not obsolete in the sense of being useless. With improved machinery, ships which are of moderate dimensions could render good services against similar ships of the same date which are found in the other navies. The larger ships of the 'Minotaur' and 'Warrior' type are available for various services. They are well adapted for conversion into armed transports, and if so employed would save the country both in peace and war large sums which are now expended on the hire of ships from the mercantile marine. Even for this limited service as transports, and after the lapse of twenty years since they were launched, they are worth, at least, half their original cost.

The comparison of strength has been interrupted for the purpose of making these explanations, and it will be completed by stating that in the class of coast defence Coast
defence
vessels vessels we have at the present time 14 ships of 41,530 tons, against 11 French ships of 29,466 tons. In 1886 the French coast defence class will have been increased

to 14 ships of 36,425 tons, without any additions to the British force of the same class. Of the British ships, with the exception of the experimental vessel, the 'Waterwitch,' it must be asserted, as in the case of the third-class ships, that none are obsolete; they are at least equal to the ships of the same dates in the fleets of foreign countries.

Pessimist
view in
England

The characteristic of the British public is to take a pessimist view of the achievements of their own Administration, and an optimist view of the state of preparation of Foreign Powers, and hence it is that we find so many ships still capable of doing good service considered as obsolete. It is forgotten by those who thus exaggerate our weakness, in the hope of obtaining large additions to our naval Estimates, that they are in point of fact supplying the strongest argument that could be urged against the policy of such an expenditure.

Ships
building

I have dealt thus far with ships actually completed, or which it is believed will be ready for sea in two years from the present time. A comparison on this basis is not a matter of opinion, it is a matter of fact; but when we pass from a comparison of completed to a comparison of ships in various and uncertain stages of advancement, and in some cases to ships merely projected, it is far more difficult to be exact, and it is quite possible that a different result may be brought out. A conspicuous instance is supplied in the able letter from Sir Edward Reed published in the 'Times' of Monday last. Sir Edward Reed, quoting from an article contributed by Mr. Barnaby to the last edition of the 'Encyclopædia Britannica,' gives the aggregate tonnage in armoured ships built and building as 437,210 tons for England, and 425,000 tons for France. On this statement it is to be remarked that while Mr. Barnaby gives a numerical

list of the English ironclads, he gives for the French only the aggregate tonnage, and that the armoured tonnage of France is made up, as he tells us in a note, of 183,000 tons of ships with hulls built of wood, many of which have ceased to be efficient, and have accordingly been treated as such in the comparisons already given. The aggregate French armoured tonnage also includes, as we are told in the same note, 155,000 tons of ships in construction. This total, however, includes two ships, the 'Brennus' and 'Charles Martel,' which, in view of the assurance given by the Minister of Marine in the French Chambers, that no new ship should be laid down in the present year, may not be actually commenced. This deduction reduces the French tonnage of armoured ships in progress to 124,000 tons, including the 'Amiral Baudin,' 'Formidable,' 'Neptune,' 'Magenta,' 'Marceau,' 'Hoche,' 'Foudroyant,' 'Indomptable,' 'Terrible,' 'Caïman,' 'Requin,' 'Duguesclin,' 'Vauban,' 'Furieux,' and 'Tonnant.' To this tonnage of armoured ships in construction we may add for armoured gunboats 10,000 tons. The tonnage of the French ironclads actually effective may be put at 194,000 tons. If we add the ships building, the tonnage is raised to 328,000 tons. This total falls far short of the 425,000 tons given by Mr. Barnaby in the 'Encyclopædia Britannica.' The difference is to be accounted for by the insertion in Mr. Barnaby's list of a large tonnage of wood-built ironclads, which are no longer efficient. Let us now turn to the figures given by Mr. Barnaby for the English Navy. The total tonnage of effective British ships has been given at 329,500. Mr. Barnaby credits us with 437,220 tons. The difference may be explained by adding to the 329,000 tons representing ships ready for sea—at the date of my address

Mr. Barnaby's comparison

French armoured construction

British
armoured
construc-
tion

at Portsmouth—the ‘Ajax,’ ‘Agamemnon,’ and ‘Conqueror,’ making up a total of 23,200 tons. The ‘Polyphemus,’ 2,600 tons, is also reckoned by Mr. Barnaby as an ironclad, but had not been reckoned as such in my former statement. We have further to add the following ships building: ‘Benbow,’ ‘Camperdown,’ ‘Rodney,’ ‘Howe,’ ‘Anson,’ ‘Collingwood,’ ‘Colossus,’ ‘Edinburgh,’ ‘Impérieuse,’ ‘Warspite,’ and ‘Hero,’ or a total of 11 ships and 97,670 tons. The addition of the ‘Polyphemus,’ the ships lately completed, and those building, brings up the total of British effective ironclads to 453,170 tons, or 15,960 tons in excess of Mr. Barnaby. The total of completed ships includes, however, 9,580 tons, representing the ‘Abyssinia,’ ‘Cerberus,’ and ‘Magdala,’ which, though available in the general scheme of Imperial defence, were not included by Mr. Barnaby as being strictly colonial vessels. The tonnage of ships building includes also the ‘Hero,’ of 6,200 tons, not laid down at the date of Mr. Barnaby’s paper. This brings us together.

Combina-
tions of
navies

We may now return to the figures originally given, representing the completed ships of France and England for 1884 and 1886, and we may ask ourselves whether the superiority which they show is adequate. The answer to this question depends upon the estimate which may be formed of the probability of any given combination of Powers against us. This is a subject outside the narrow range of the present statement, and on which the public will not look for guidance to specialists in naval technicalities. It is certain that we have at present, and in the near future, a considerable advantage in ironclads over our most formidable rival. If we suppose a combination with Italy, the fleets of France would be reinforced with two first-class ships, the ‘Duilio’ and

'Dandolo,' already for some time in commission, and with two still more formidable ships, the 'Italia' and 'Lepanto,' which may be ready within a measurable period. If we add these four ships to the tonnage already given of first-class vessels in the French Navy, it is clear that we are equal to such a combination, while our advantage in ships of the older type would fully cover any similar force which might be combined against us under the flag of Italy. This combination has been considered as an hypothesis. To practical politicians no political event can appear less probable. The combination of Germany with France in a war against England cannot be considered in a serious light. If we take another hypothesis, that of a combination of Russia with France, we should perhaps have less to fear than in the case of France and Italy combined.

France
and Italy

We have limited ourselves thus far to a comparison of armoured tonnage, and the result undoubtedly points to the necessity of maintaining our armoured building at least at the average produced under the present Board. Comparison limited to ironclads is obviously most imperfect. It leaves completely out of view whole classes of vessels which the changes in naval warfare tend to render more and more indispensable as auxiliaries to the battle-ships. At Portsmouth I urged the importance of pushing forward the construction of torpedo vessels of various classes. A considerable number are necessary for the defence of our dockyards, our naval ports, and our coaling stations. Torpedo vessels are also required of a larger type to act in combination with our seagoing squadrons.

Torpedo
craft

The protection of our commerce would throw an enormous responsibility on our Navy in time of war. In a class of vessels of high speed, and armed and protected

Commerce
protection

in a manner sufficient to enable them to give a good account of any probable enemy, the present Administration have made a great advance in the rate of construction. We found the Navy in a position of considerable inferiority to the French in fast unarmoured vessels. We have brought it to a position of superiority. Should the construction of vessels of this class be proceeded with at the average rate of the last four years we shall gradually acquire a decided advantage.

Mercantile
auxiliaries

It is further to be observed that the mercantile marine is capable under wise administration, and under judicious help and encouragement, of doing much for its own defence against the improvised cruisers of foreign Powers. Considerable progress has been made by the present and former Administrations in this direction. We have a large fleet on the Admiralty list of great speed, and well subdivided into watertight compartments. Modern armaments should be provided for a considerable number of these vessels, and this is one of our pressing necessities. The protection of our coaling stations is another matter of urgency, and the correspondence lately made public will show that the Government are alive to the requirements of the Empire, and have made proper arrangements for the commencement of the work.

Naval
estimates

Having offered these explanations, having shown what is our exact position as a Naval Power in regard to the material of war, and having shown in what direction and in what classes of vessels an increase is most desirable, I cannot enter into any discussion as to the sufficiency of our present Estimates. I can only say that hitherto, while anxious, as every administrator ought to be, to do more for the naval service, we have kept the country in a foremost place. Complaints are rife of our neglect of the Navy. The Press and a large section of

the public are clamorous for great additions to our naval Estimates. In the meanwhile the economists are silent. If we hear them at all, we hear murmurs such as those to which, on a late occasion, Sir Stafford Northcote gave expression—of the growth of expenditure under the present Government. If a large addition were made to the naval Estimates, and taxation were incurred for that purpose, the economists would be loud in their complaints ; while the advocates for increased expenditure on the Navy, especially those whose political connections are with the Opposition, would do little to help the Government in resisting the criticisms to which they would be subjected.

The facts of the case have now been brought before the public by myself and other far more competent authorities, and it is for the Cabinet, and still more for that public opinion to which even Cabinets must bow, to determine the measure of the naval expenditure of the future. Having been for many years one of a small band of members of the House of Commons who have taken an interest in naval affairs, I cannot but observe with satisfaction the revival of the public concern in the condition of the Navy. The present Board have done much to increase its efficiency. If more shipbuilding is required, it cannot be covered by a reduction in the number of men or in the force we maintain on foreign stations. In so far as I may venture to tender advice to my fellow-countrymen, I would deprecate panic, which there is nothing to justify, and sensational additions to the Estimates, which would probably be followed by corresponding increases elsewhere, and throw a heavy burden on the taxpayers without securing for ourselves any substantial relative advantage. The defences of the coaling stations and the mercantile marine

Public
interest
in the
Navy

ports have been provided for, and I ask for the confidence of the country in the firm determination of the Government to do what is necessary for the Navy.

I cannot conclude without remembering that I am addressing you on a day for ever memorable in our naval annals—the anniversary of the victory of Trafalgar. We have been treating our position as a Naval Power upon the narrow basis of our preparation in the material of war ; but it is upon our seamen and their officers that we place our main reliance. Their history in the past has been a brilliant record, and during my recent visits to our seaports I have seen in the men of our own day a spirit and an ability worthy of their illustrious predecessors of the days of Nelson.

XIV

STATEMENT ON THE NAVY

SPEECH IN THE HOUSE OF COMMONS, DECEMBER 2, 1884

It now devolves upon me to make the promised statement, on behalf of the Government, with respect to the Navy. In the present anxiety out-of-doors, it was the obvious duty of the Government to give the House an opportunity of discussing the subject ; and I can assure the House that the opportunity is not less welcome to the Admiralty than it is to the most impatient of their critics. We feel our great responsibility for the maintenance of the naval power of the country, and we know that much of the criticism to which we have been subjected is due to imperfect acquaintance on the part of the public both with what we have done in the past and what we propose to do in the future.

In view of the optimist estimates of foreign navies, and the pessimist estimates of our own Navy, which of late have been so widely circulated, I might be strongly tempted to give in detail the results of an examination of the naval situation. It is, however, impossible to present such a statement in a form which would be suitable for parliamentary discussion. If we compare ships with reference to thickness of armour, we must also take into consideration the area protected. If we compare them with reference to the calibre of the guns, we must also take account of the number of guns which

Difficulty
of com-
parison

they carry. If we compare their speed, we must also take into consideration coal endurance, certainly one of the most essential qualities in determining the fighting qualities of a ship. On the whole, we may take displacement as, perhaps, the fairest test of the relative power. In the hands of a skilful architect, it means more armament, speed, coal endurance, or seaworthiness. But even if we were to adopt displacement as the measure of power it would be an imperfect test, unless we took into consideration the date when the design was prepared.

English
and French
ironclads

Waiving these objections to any comparisons of ships, I will give some general statistics, which may probably be of interest to the House. Throwing aside all arbitrary divisions of ships into classes, the Board of Admiralty carefully compared the French and English completed ships, extending their examination to those which will be completed next year. Taking the more modern ships, there are on the English list 30 ships, of 210,430 tons, and on the French list 19 ships, of 127,821 tons; showing a balance in our favour of 11 ships. Taking what I may call the quasi-obsolete ships, the English list shows a total of 16 ships, of 115,520 tons, and the French list 12, of 53,066 tons—a balance in our favour of four ships of that class. Thus the English list includes a total of 46 ships, of 326,000 tons, and the French list a total of 31 ships of 181,000 tons. Having given to the House the result of a comparison of ships under a very broad classification, I may carry this comparison somewhat more into detail by giving the names of the most important ships. We have five large turret-ships on the English list—the ‘Devastation,’ the ‘Dreadnought,’ the ‘Inflexible,’ the ‘Thunderer,’ and the ‘Neptune,’ with an aggregate of 50,000 tons. With

these we may compare three French ships—the ‘Amiral Duperré,’ ‘Dévastation,’ and ‘Redoutable,’ with an aggregate of 28,990 tons. We then come to a long list of highly efficient ships, although, in view of the development of naval architecture, we may, perhaps, hardly call them ships of the first class, or of the newest type. The list includes the ‘Alexandra,’ ‘Téméraire,’ ‘Superb,’ ‘Monarch,’ ‘Audacious,’ ‘Invincible,’ ‘Iron Duke,’ ‘Nelson,’ ‘Northampton,’ ‘Swiftsure,’ ‘Triumph,’ ‘Shannon,’ ‘Hotspur,’ ‘Rupert,’ ‘Hercules,’ ‘Sultan,’ ‘Ajax,’ and ‘Agamemnon’—in all, 18 ships, with an aggregate tonnage of 131,199 tons. Against these we may put nine French ships of a similar character with an aggregate of 78,170 tons, including the ‘Colbert,’ ‘Trident,’ ‘Richelieu,’ ‘Friedland,’ ‘Marengo,’ ‘Suffren,’ ‘Océan,’ ‘Bayard,’ and ‘Turenne.’ All these French ships, except the ‘Friedland,’ are wood-built; all the English ships are iron-built. Taking the older ships *en bloc*, for their names are well known, we have 14 ships of 112,410 tons, against 12 French ships of 55,981 tons. All the latter, with one exception, are wood-built. Our own ships are of iron, except the ‘Lord Warden’ and the ‘Repulse.’ In the coast defence class we have, including the ‘Orion’ and ‘Belleisle,’ 16 ships of 51,270 tons, against 13 French ships of 40,634 tons. The French list includes the ‘Fulminant’ and ‘Tonnerre.’ They are powerful ships for harbour-defence, but not, perhaps, in the fullest sense, seagoing vessels. It is, perhaps, unnecessary to give, in the same detail, the strength of other Powers. The only first-class ironclads which are yet completed are the ‘Duilio’ and ‘Dandolo’ for Italy, the ‘Peter the Great’ for Russia, and the ‘König Wilhelm’ for Germany. It will be admitted that in completed ironclads we stand well both in number and tonnage.

Less
modern
types of
battle-ships

Advance
in speed
and arma-
ment

With regard to the types and designs of our ships, we do not shrink from any comparison with the ships of foreign Powers. I may say, on this point, that the present Board have endeavoured to press forward the improvement of designs. All our more recent first-class ships have a designed speed of at least 16 knots, as compared with the 14 knots of the 'Inflexible'; and the 'Conqueror,' though not, perhaps, a first-class ship, has a speed only a fraction below 16 knots. The armaments have been advanced from the 38-ton guns of the 'Ajax,' to the 43-ton guns of the 'Collingwood,' the 67-ton guns in later ships of the 'Admiral' class, and the 110-ton guns of the 'Benbow.' The power of the 67-ton gun is not exceeded by any guns in construction for the French or any other foreign navies.

Unarmoured
construction

I now pass from the armoured vessels to those cruisers for the protection of commerce, which to a great commercial nation are scarcely second in importance to the ironclads for the line of battle. Our present condition in regard to unarmoured vessels is as follows: Taking vessels of over 13 knots, not being transports or mere despatch-vessels, we have 33 ships built and completed with an aggregate of 89,650 tons, and 15 building with a total of 40,590 tons. Our tonnage in construction in the unarmoured classes is equal to the combined efforts of the naval Powers of Europe. It has been the special aim of the present Board to produce a fleet of cruisers of the most effective type. The speed has been increased in the larger types from 13 to 17 knots, in the corvettes and sloops from 10 to 13 knots, and in the two gunboats now building at Devonport we have advanced from 10 knots to 14 knots. Great pains have been taken, and a large additional expenditure has been incurred, in order to give to the cruiser class more com-

plete protection and the most effective armaments. The inclined deck of the 'Mersey' is considered equal in resisting power to a 6-inch vertical belt at the water-line. This form of protection should, therefore, bring the ship up to a level with the Russian belted cruisers, which, though reckoned as ironclads, are protected only with a 6-inch armoured belt. The nature of the protection in the 'Mersey' class is identical with that of the largest Italian ironclads. We do not put the 'Mersey' class forward as ironclads; but in many circumstances, at sea, their protection quite equals that afforded by thin armour. We have four 'Merseys' now in construction.

From the armoured and the unarmoured vessels I turn to the torpedo vessels and boats. In this class we admit that of late little has been done in comparison with the efforts of some foreign Powers. It is necessary, however, to point out that the torpedo boats, whether of the first or second class, which are found in such large numbers in foreign navies, are only available for coast-defence, or for operations at sea within a limited area. They are not sea-keeping vessels, and could neither maintain a blockade, nor cruise on the routes of our ocean-borne trade.

Torpedo
flotilla

I pass from these observations on the comparative strength of the Navy and the type of our ships, to review briefly the policy pursued by the present Board. For the early years of our administration I cannot give any information more authoritative or more lucid than that supplied by the following observations taken from the speech delivered by the Chancellor of the Duchy of Lancaster (Mr. Trevelyan) in the debate raised by the noble Lord the Member for Chichester (Lord Henry Lennox), in April, 1882. My right hon. friend, on that occasion, spoke as follows :

Policy
of the
present
Board

Lord
North-
brook's
policy

'When Lord Northbrook became the First Lord of the Admiralty, it became their business to examine the state of their own and foreign navies, and the conclusion at which they arrived was, that the time had come when they ought to increase the rate of iron ship-building ; and so, without making any noise about it, they began building the ships which the right hon. gentleman opposite had commenced, at a faster rate. In 1880-81, instead of 7,231 tons, Lord Northbrook actually built 9,235, and in 1881-82, 10,816 tons ; and this latter estimate was adhered to within 100, or, he might say, 40 tons. . . . That was the quiet and unsensational, and not ineffectual way, in which they had dealt with the situation.' [3 *Hansard*, cclxviii. 1057.]

Following up the policy described in its initial stages by my right hon. friend, the present Board increased the construction of ironclads to 12,548 tons for 1883-84. To provide for this steady increase of building, and for the addition of some 1,399 men to the number employed on repairs, the Shipbuilding Votes were increased from 3,147,000*l.* in 1880-81 to 3,830,623*l.* for 1883-84, with a slight increase for 1884-85.

Rapidity
of con-
struction

It has been the special policy of the present Board to maintain a high rate of construction, not only by laying down, as stated by my noble friend in 'another place,' two ships for the British Navy for every ship laid down in France, but even more by accelerating the rate of construction ; and we are glad to find that, in spite of the delays which are inevitable in consequence of a complete change of armament from the muzzle-loading to the breech-loading system, in this most important element of shipbuilding, we have made good progress. The 'Impérieuse,' 'Warspite,' 'Howe' and 'Anson' will be completed each in about four years ;

and the 'Hero,' a ship of over 6,000 tons, laid down in 1884, will be completed in 1887. There are obvious objections to any unnecessary comparison of our proceedings with those of foreign administrations ; but it is my duty to obtain justice at the hands of their fellow-countrymen for the able staff of constructors who are responsible for the shipbuilding of the British Navy. With this object in view, a comparison of the rate of progress in construction may not be considered invidious. The dates of laying down, launching, and actually completing for sea, are the only certain marks of progress ; and hitherto the interval which separates the laying down from the completion of a foreign ironclad has, more especially in the case of the recent ships which I have named, been considerably longer in the foreign yards than in the English yards. If we take all the ships now included in the French shipbuilding programme, and compare the dates at which they were laid down with the earliest date at which it is believed they can be completed, we shall find that the number of years during which the ships will have been in construction ranges from ten to six, the average for 15 ships being seven and a half years. I find that these figures are supported by M. Gougeard, a former Minister of Marine in France. M. Gougeard has recently published a pamphlet on the state of the French Navy, in which he draws the conclusion that French ironclads take, on an average, about ten years to complete. He instances the 'Tonnerre,' which was laid down in 1872, the 'Fulminant' in 1874, and the 'Dévastation' in 1875, and he tells us that all these ships were still under construction in 1883. The 'Foudroyant,'¹ another example, was laid down in 1875 ; she will not be completed,

French
rate of
construction

¹ Now 'Courbet'—ED.

M. Gougeard tells us, until 1885, and he throws some doubt even upon that date. I will now ask the House to contrast these figures with those I am able to give for the English ships. In the case of the English ships we find the number of years occupied between the laying down and completion ranges from six to three years, and the average time for 12 ships is four years and eight months.

Construc-
tion abroad

I have already referred to the large increase in the Shipbuilding Votes, an increase rendered necessary, as stated by my right hon. friend the Chancellor of the Duchy of Lancaster (Mr. Trevelyan), in view of the great development which had taken place in construction and the expenditure on construction in France. But it is a necessity of the position in which we are placed that we are compelled to have regard to the course of policy, not of any single Administration, but of a combination of Powers; and while ironclad construction has been practically suspended in the United States, and reduced to very small proportions in Germany and Austria, it is being carried forward in Italy with the sustained activity so steadily exhibited since 1871; and in Russia we know that the Shipbuilding Votes have of late been greatly increased in order to push forward the construction of some new and powerful ironclads which were laid down in the course of last year. In these circumstances, much as we may regret the necessity, we feel it our duty to propose to Parliament an increased expenditure on armoured building.

Increase
of torpedo
vessels

There are other classes of vessels in which it is even more desirable to add to the strength of the Navy at the present time. I have admitted our deficiency in a torpedo flotilla. The great improvements which have taken place within a few months in the range and in

the accuracy of aim with which the torpedo can be fired justify us in making proposals, which could not have been justified before, for an increased expenditure on the construction of a flotilla of seagoing torpedo vessels.

In addition to the torpedo vessels, we propose to make a special effort in the construction of ships for the protection of trade. It is not easy to fix a standard of strength at which our battle-ships should be maintained ; but when we come to deal with the question of what number of ships may be necessary for the protection of our great commerce, the difficulty is infinitely greater. A means of attack upon our commerce may be improvised to an extent which it is quite impracticable to measure, by the conversion of merchant steamers into cruisers, armed with a few light guns. On the other hand, the risks exposed to such an attack are of enormous magnitude, and, indeed, of vital importance to this country. It has been computed that the value of British shipping and merchandise yearly placed upon the ocean is not less than 900,000,000*l.* sterling, and that we have at all times afloat on the seas property in ships and merchandise of the value of not less than 144,000,000*l.*, the greater part being engaged upon distant voyages. The present Board have been gradually developing our resources for the protection of commerce. The late Board of Admiralty laid down an admirable type for the purpose in the 'Leander' class. We have followed their footsteps by producing the 'Mersey' type, and we now propose to go a step further in the same direction by laying down vessels equal in speed to the 'Mersey' class, and protected by a belt in lieu of an armoured deck. The belt is a feature which will be approved by my hon. friend who sits behind me (Sir Edward J. Reed).

Protection
of com-
merce

Amount
asked for
ship-
building

The creation of a torpedo flotilla having now become a necessity—and I may say a new necessity—for the Navy, and deeming it to be our duty to avail ourselves of an opportunity of an unusual character afforded by the condition of the shipbuilding trade to strengthen the fleet in ships for the protection of commerce, we now propose to put out to contract an immediate order for a considerable addition to our fast cruisers and our torpedo flotilla. The total amount which we ask Parliament to grant for shipbuilding to be executed by contract is 3,085,000*l*. The extra grant is intended to be spread over five years. The amount to be taken for 1885–86 is 800,000*l*. We propose to order all the larger vessels as soon as the designs are prepared. The torpedo boats we propose to order at the rate of ten every year. We prefer to build the torpedo boats gradually, because we do not wish to deprive ourselves of the advantage of the improvements which are constantly being introduced.

Dimen-
sions of
battle-
ships

I will now endeavour to give the House some details with regard to the types of the ships we propose to build. The statement which I propose to make is one which is always interesting to the House, and which, I may say, is always criticised with great ability. Our proposal for increased construction embraces all the best types now represented in the Navy, and some new designs which, we trust, will prove valuable additions to the fleet. I will take first the battle-ships. We have always adhered to a policy of reasonable dimensions. Instead of advancing to the immense tonnage of the Italian ships, we have thus far adhered to the limit of 10,000 tons, with, I venture to say, highly advantageous results in rapidity of construction, and in the number of ships which can be built for a given sum of money. We hold that the value of large ships is inevitably diminished in propor-

tion as the power of attack with the torpedo becomes more formidable. But, on the other hand, we recognise that the gun is an essential arm of the Navy. Where heavy ordnance is carried hydraulic machinery and mountings are required, and for the protection of vulnerable mechanism armour is indispensable. On this ground, and also on more general grounds, large ships, capable of carrying numerous crews, with the seaworthy qualities and coal-endurance necessary in a sea-keeping ship, must always form part of the fleet of a great naval Power. We have given our most careful consideration to various designs for our new battle-ships, but one only has been approved by the Board. The new armoured ship which we propose to lay down early next year at Chatham has a displacement of just over 10,000 tons. On this tonnage it has been decided to combine guns of the greatest power yet manufactured—namely, guns of 110 tons—and armour 18 inches in thickness. Our manufacturers are of opinion that with the existing skill and power of manufacture you will not get full value for your money if you increase the armour beyond the limit of 18 inches in thickness. With such framing behind the armour as it is hoped to give, it is not considered that the armour of the new ship will be inferior in resisting power to any armour in existence. The armament includes, as I have said, 110-ton guns. Two guns of this size are to be placed in a turret, protected by the same armour as that on the belt. The other guns in the ship will be one of 18 tons right aft, and protected by armour, and twelve 5-ton guns, six on each side. These twelve guns it has also been decided to protect by armour, proof not only to all machine guns, but also to the new six-pounder shell guns. The estimated speed is $15\frac{1}{2}$ knots. In addition to this ironclad,

Particulars
of new
battle-ship

Armament

which, as it has been stated, will be laid down at Chatham, we propose, as soon as the designs are completed, to lay down three more ships of the first class. One of these will be built at Portsmouth or Pembroke. The two other ships will be built by contract. When these additional ships are in hand, we shall have 15 ships in progress, 12 being of the first class. Of the 15, six are launched and in the completing stage. With regard to all of them, I desire to give an assurance to the House that they will be proceeded with as rapidly as possible.

Mr. W. H. SMITH : Will my hon. friend forgive me if I interrupt him. I understand him to say that there are four first-class ironclads in all to be laid down ?

Sir THOMAS BRASSEY : Yes ; that is so.

Mr. W. H. SMITH : Two to be built by contract, and two by the Admiralty in the dockyards ?

Sir THOMAS BRASSEY : That is so.

Mr. GORST : Did I understand the hon. gentleman to mention Devonport and Chatham as the places where these ironclads will be laid down ?

Sir THOMAS BRASSEY : The resources of Devonport are not adapted to the building of first-class ironclads.

Cruisers
to be built

I now turn to the protection of commerce ; and I wish to say to the House that we desire to present the protection of commerce as the main purpose of the large additional expenditure on building for which we are asking the sanction of the House. For this purpose we propose two types which have grown out of vessels already included in our programme. The most powerful which we wish to introduce may be described as the belted cruisers. The other type is a slightly improved 'Scout.' The belted cruiser is a ship of about 5,000 tons displacement, and 3,000 tons weight of hull, including armour. The total weight of armour is 1,000 tons. She is, therefore, in one

sense, an ironclad, her water-line being protected by side armour, or an armoured deck, from end to end. She is also an ironclad in the sense that her directing house—a new term for the conning tower, containing the steering wheel and directing instruments—is strongly armoured. From this house the underwater broadside torpedoes, and the guns, can be fired, and the ship can be steered when in action. In another sense the belted cruiser is not entitled to be called an ironclad, because her guns' crews will have no armour-protection. They will be protected only by shields against the fire of the lighter machine-guns. The guns will be two of 18 tons and twelve of 5 tons, with numerous machine-guns. The estimated speed is 17 knots ; the complement will be 350 men ; the coal-supply will be sufficient for 2,000 knots at full speed and 8,000 knots at the reduced cruising speed of 10 knots. We might have produced a ship with higher speed by sacrificing protection, or by accepting increased dimensions ; but with a given expenditure an increase of dimensions is tantamount to a reduction of numbers, and we hold numbers of ships to be essential for the protection of our world-wide commerce. The qualities which I have detailed to the House, and which we hope to realise in the belted cruiser, present a type which, I venture to say, through all the changes which may take place in the future in naval warfare, will scarcely become obsolete. We propose to lay down three belted cruisers by contract and two in the dock-yards. In addition to the belted cruisers, we propose to lay down 10 modified 'Scouts'—nine of which are to be put out to contract.

Belted
cruisers

Mr. W. H. SMITH : Will my hon. friend allow me to ask what progress is proposed to be made with these ships in the course of next year ?

Sir THOMAS BRASSEY: We shall proceed at the utmost speed, consistent with due economy, in the dock-yards; and with regard to contractors, no obstruction will be imposed upon their exertions.

New
'Scouts'

I will now give the House a brief description with which I have been furnished by the Chief Constructor, Mr. Barnaby, of the modified 'Scout.' The modified 'Scouts' are almost identical with the two now building; they will differ from them in having the gun armament more fully developed, and the torpedo armament somewhat reduced. They will be armed with six 5-ton guns, and, as they have good coal endurance, they will, though only jury-rigged, be efficient for service as cruisers in time of peace, and as fast torpedo auxiliaries in time of war. The estimated speed for these vessels is 16 knots. The coal-supply is equal to 1,650 knots at full speed, and 7,000 knots at 10 knots. They are well subdivided, and they give a combination of qualities which may be considered to be very economically obtained at a cost of a little over 60,000*l.* for hull and engines.

New
torpedo
vessels

Having dealt with the battle-ships, and the protection of commerce, we have to take in hand the construction of a torpedo flotilla. Torpedo vessels are scarcely inferior in importance to fast cruisers. We hold that for the British Navy sea-going vessels capable of cruising with our squadrons are far more necessary than mere harbour-defence boats. We regard the 'Scouts' as a portion of our torpedo flotilla; and we also propose two special armoured torpedo rams. Our torpedo ram is a vessel of 3,000 tons displacement, rather longer and wider than, but otherwise identical with, the 'Polyphemus.' The under-water arrangements will be similar, except that there will be no torpedo discharge through the ram itself. The experiments with the 'Polyphemus'

have shown that the associated elements of speed with the ram and the broadside torpedo discharge under water make a most powerful combination. These it is designed to reproduce, but, in doing so, to give greater habitability by building an ordinary ship from above the turtle-back deck, which will be protected with 3-inch armour. This, with an addition to the supply of fuel, will give to the new type independent cruising-power, which the 'Polyphemus' was not designed to have. My right hon. friend opposite (Mr. W. H. Smith) knows the intentions which were present in the minds of the designers better than I do; but I believe that the 'Polyphemus' was designed as a tender to battle-ships. The experimental expenses connected with the 'Polyphemus' will not reappear in the new Estimates, as the torpedo discharge and the boiler questions have now been worked out. I have never been one of those who have criticised these expenses. Experiments must be expensive, and the Board of Admiralty should never be deterred from carrying forward experiments because they must necessarily be expensive. The armoured torpedo ram will have a small gun armament; the estimated speed is $17\frac{1}{2}$ knots; the coal-supply is equal to 1,600 knots at full speed, and 6,400 knots at 10 knots. These are the various types of vessels which we submit to the approval of the House.

New
'Polyphemus'

I will now enumerate to the House the new vessels which we intend to lay down. The list includes four ironclads of the first class, five belted cruisers, two armoured torpedo rams, ten 'Scouts,' and ten first-class torpedo boats. Of these we propose to put out to contract two ironclads, three belted cruisers, nine 'Scouts,' and the torpedo rams and boats. The remaining vessels will be laid down in the dockyards.

Summary

Mr. W. H. SMITH : Four ironclads altogether ?

Sir THOMAS BRASSEY : Yes.

Total
amount of
construc-
tion pro-
jected

In addition to the new work I have detailed, we shall push forward the construction of all vessels now in hand at the highest economical speed. We propose to raise the armoured construction in the dockyards to 12,000 tons weight of hull. We propose to build, of unarmoured ships, in the dockyards 5,500 tons, making a total of 17,500 tons to be built in the dockyards. By contract we propose to build of armoured ships 3,050 tons, and of unarmoured ships 8,940 tons ; and if we may speak of the tonnage of torpedo boats—and very expensive it certainly is, measured by the ton—of that class we propose to build 350 tons, making the total to be produced by contract 12,310 tons. The grand total of the construction proposed in Her Majesty's dockyards and by contract for 1885–86 is 29,810 tons weight of hull, as against 20,679 for the present financial year.

The increase of construction over that provided for the financial year 1884–85 will be 9,131 tons. The orders for the new ships will be given, as I have already stated, as soon as the designs are matured ; and we anticipate that the battle-ships may be completed for sea in four years at the latest, the belted cruisers in three years, and the remaining vessels in less than two years.

It is impossible for the Board of Admiralty to assume anything like finality in the amount of construction which is to be proposed for the Navy. The proposals we now submit to the approval of the House provide, as we contend, a substantial addition to the power of the Navy. At the time when we make it, and in the circumstances in which we make it, we claim that it is a sufficient proposal. It will be for the Board of Admi-

ralty of the future to increase or to diminish the rate of building for the Navy, according to the view which they take of the exigencies of the time. The total cost of the new ships to be put out to contract will be 3,085,000*l.*, and the addition to the Contract Vote for next year will be 800,000*l.* In making provision for requirements for which it is absolutely impossible to fix a common measure we cannot hope that our proposal will command universal acceptance. It will, at least, be admitted that the additions to the Estimates of expenditure and the rate of construction have not been restricted by any narrow conception of the standard at which the British Navy ought to be maintained. As to the financial arrangements which may be necessary in order to carry out these proposals, I am not competent, nor is it necessary that I should enter upon them. They will be explained to the House at the proper time by the Chancellor of the Exchequer.

And now, Sir, having dealt with the increase of shipbuilding, I turn to the coaling stations.

MR. RITCHIE : Will the work be taken by tender, or how will it be done ?

SIR THOMAS BRASSEY : Yes, it will be let by tender.

With regard to the coaling stations, it is obvious that the statement on this subject should more properly have come from my noble friend the Secretary of State for War, or some other representative of the War Office ; but it has been thought by the Government that it would be for the convenience of the House if a brief outline of our proposals were included in the general statement with reference to the Navy which it is my duty to make to the House. The defence of the coaling stations abroad and the mercantile harbours at home is, as we admit, one of the most urgent necessities of the

Defence of
coaling
stations

moment, and a necessity intimately connected with proposals for strengthening the Navy. The consideration of a general and comprehensive plan for the defence of the coaling stations has been delayed, because the subject has been referred to the Royal Commission on Colonial Defence. The case, as to the coaling stations, cannot be put more concisely than in the words used by my noble friend the First Lord of the Admiralty in 'another place' in a recent discussion. He said :

'No one can fill the position of First Lord of the Admiralty without being aware that, of all the measures that could be taken by this country for its defence in time of war, none can be more urgent than the defence of our coaling stations. It is a measure which, of all others, would strengthen our naval force, for the obvious reason that, if the coaling stations are left unprotected, we should have to provide for their defence by ships of war which, if they were fortified, could be employed in offensive operations.' [3 *Hansard*, cxcxiii. 1548.]

Papers have already been presented to Parliament stating the measures to be taken for the defence of the coaling stations. Some further proposals for the defence of second-class stations, and for the provision of submarine defence, have since been adopted. The Revised Estimate stands as follows. Coaling stations of the first class—Aden, Ceylon, including Trincomalee and Colombo, Singapore, Hong Kong, Cape of Good Hope, including Mauritius, Jamaica, and St. Lucia. The cost for the armament and works at these stations is estimated at 976,760*l.*, from which amount should be deducted the sum of 330,470*l.*, subscribed by India and the Colonies, leaving an Imperial charge for works and armament of a little over 646,000*l.* A further charge of 178,500*l.* for the defence of second-class stations and

for submarine defence brings the total charge on the Imperial funds to the sum of 824,900*l*. Should further questions arise in the course of this debate, it is obvious that the noble Marquis, or some representative of the War Office, will be in a better position to give the details which may be demanded by the House.

There are two other subjects of great importance of the same class as the defence of the coaling stations. The first is the protection of commercial harbours. The Committee presided over by the Earl of Morley has made certain recommendations for the defence of commercial harbours. Those proposals are under the consideration of the department of the Government principally concerned. There is also another question of the same class, namely, the sea-defence of what are called our military ports, such as Portsmouth and Plymouth. This also is under consideration, and the Government will shortly be in a position to state what they propose to do.

Commer-
cial har-
bours

For the naval ordnance the Government ask Parliament to approve of an increased expenditure of 1,600,000*l*. Of this, 400,000*l*. will be required in 1885-86, and 300,000*l*. in the four ensuing years. My hon. friend the Surveyor-General of the Ordnance (Mr. Brand) will be prepared to give further details as to this Estimate, should he be called upon to do so, in the course of this debate. With reference to the more strictly naval aspect of the question, I am informed by the Director of Naval Ordnance that he is confident the supply of guns will keep pace with the advancement in construction. The 100-ton guns for the 'Benbow' are in course of construction at Elswick. The 63-ton guns for the 'Rodney,' 'Howe,' 'Camperdown' and 'Anson' are in hand. Those for the 'Rodney' should be complete in March of next year.

Naval
ordnance

The guns for all the remaining vessels are in hand, and will be completed in 1885-86, except those for the 'Anson' and the reserve guns, which will be ready in 1886-87.

Mr. W. H. SMITH : They will all be ready next year except in the case of the 'Anson'?

Sir THOMAS BRASSEY : Yes ; they will all be ready in 1885-86, except those for the 'Anson' and the reserve guns. Forty-three-ton guns have been provided for the 'Conqueror,' 'Colossus,' 'Edinburgh,' and 'Collingwood,' leaving for 1885-86 the 'Hero's' guns, and two 43-ton guns for the reserve.

Mr. W. H. SMITH : What will be done with regard to the lighter guns?

Sir THOMAS BRASSEY : I regret to say that the Memorandum I hold in my hand does not show the extent of progress in reference to guns of a lighter calibre.

Expendi-
ture pro-
posed

The total expenditure of the Navy under the several proposals which I have detailed will be—for shipbuilding, 3,100,000*l.* ; naval ordnance, 1,600,000*l.* ; and coaling stations, 825,000*l.* It is anticipated that the whole of this expenditure will be incurred in the next five years. I may explain that the increase for guns is in addition to the charge of 500,000*l.* already included in the Army Estimates for naval ordnance for the present year. The expenditure upon naval ordnance (arising from the change of system) will certainly be enormous, but it is more than paralleled by the expenditure in other countries for a similar purpose.

Mr. A. J. BALFOUR : What will be the expenditure this year?

Sir THOMAS BRASSEY : The additional expenditure upon naval ordnance next year will, I understand, be 400,000*l.*

General Sir GEORGE BALFOUR: Will that include protection for harbours?

Sir THOMAS BRASSEY: No. It is obvious that the amount of protection given to the ports and coaling stations has an important bearing upon the general question of the amount of naval force which it may be necessary to create and maintain. Our proposals, therefore, in relation to shipbuilding are subject to increase, if, upon full consideration of the requirements for the coast defences, such increase should be necessary.

The House is aware that the Government are pledged to apply for the appointment next Session of a Committee to consider both the Naval and Marine Expenditure; and to that Committee the proposals I have detailed to the House must be submitted for consideration.

In laying, I am afraid very imperfectly, and under great pressure, plans of such large and comprehensive character before Parliament, there are one or two general considerations which I desire to present to the House. And, first, I would remark that the expenditure, under the direction of the War Office, to meet the requirements of the Navy, is strictly and absolutely defensive. The expenditure under the War Office for the coaling stations abroad represents the arrears which we have to pay—gaps, as it were, in the walls which surround our great Empire, which have been left to us to fill up by former Governments. The question of the defence of the coaling stations has, year after year, been brought before the Minister of War by the Inspector-General of Fortifications. The first direct action which was taken was the appointment by the right hon. baronet the Member for East Gloucester (Sir Michael Hicks-Beach) of the Royal Commission on which for a time I had the honour

Policy one
of defence

to serve. It now devolves on us to carry out the recommendations of the Commission. To a large extent, the observations I have made with reference to the expenditure under the War Office are true of expenditure under the Admiralty. Even when increased in the proportions which we propose, our shipbuilding will be largely devoted to vessels specially designed for a defensive purpose—that is to say, for the protection of commerce. Ships of this class have, indeed, always been a prominent feature in our building programme, and throw a heavy burden upon the Admiralty of this country. It is for this reason, as I have already explained, that when we come to measure ourselves with other Powers in vessels designed for battle, the strength at our disposal seems inadequate to the greater expenditure which we have incurred. Our ships, as we are glad to know, have been largely employed, not in warlike operations, but in operations of a most beneficent character—in giving freedom to the slave, in giving protection to the solitary pioneers of commerce and civilisation, and in the prosecution of scientific research. Viewed in another aspect, the Navy may be regarded as a link which helps to bind together the Mother Country and her Colonies. In asking the consent of Parliament to the plans which have been described, it may be truly said that they are not a menace to foreign Powers, with whom we desire to remain, as we now are, on terms of amity and peace, but they are to provide a defence for ourselves. If, indirectly, they tend to increase our strength as a naval Power, it is, I know, the firm resolve of my country to use her power at all times to protect the feeble and the oppressed, in the cause of equity and justice, and to extend civilisation.

XV

*THE ADMINISTRATION OF THE NAVY,
1880-85*

REPRINTED, BY PERMISSION, FROM THE 'NINETEENTH
CENTURY,' JANUARY 1885

It is proposed in the present paper to give a general view of the administration of the Navy under the late Government. In dealing with naval affairs political partisanship should be forgotten. It is believed that the present statement will be found impartial and accurate.

As an introductory observation it may not be superfluous to remark that each successive administration is bound, at least at the outset, to a large extent by the policy of their predecessors. Now what was the state of the Navy as it was handed over to us by our predecessors? What was the standard of expenditure which they had accepted? What were the distinctive features of their administration? They had devoted great attention to the repairs of the fleet. They had been called upon to prepare for warlike operations in the East. The construction of ironclads had been retarded by the controversy raised by Sir Edward Reed as to the design for the 'Inflexible'; but four ironclads had been purchased out of money provided under a vote of credit. During the Russo-Turkish war the naval expenditure had been largely increased, and at the conclusion of peace a policy of retrenchment was naturally desired by the country.

Policy
of past
adminis-
trations

We cannot complain of the reduction of Estimates in the year immediately preceding our acceptance of office ; but it may be claimed for the Board of which the present writer was a member, that its policy must in fairness be viewed in connection with that of the previous Board.

*Personnel
of the
Navy*

Dealing first with the *personnel* of the Navy, successive Admiralties have come to a common understanding that the force of bluejackets should be maintained at an average of from 18,000 to 19,000. Lord Northbrook accepted this decision, and, finding that the number of boys in training was insufficient, he largely increased the entries. It is a point of supreme importance to maintain an adequate reserve of men for the Navy. It was decided by the late Board of Admiralty to equalise the numbers in the First and Second class, and to maintain the Reserve at a strength of 20,000. With this force, with 4,000 highly trained seamen in the Coast Guard, with 5,000 men in the Seamen Pensioners' Reserve, and with a body of Royal Naval Artillery Volunteers, which, encouraged by the capitation grant accorded by the present Government, we hope ere long to see raised to 4,000 or 5,000 members, an ample number of men will be available to meet any sudden emergency. In lieutenants, and in our engine-room complements, we should be deficient. For reinforcements we should appeal with confidence to our noble merchant service.

*Naval
Reserve
officers*

In the cruise of the experimental squadron under Admiral Hornby several officers of the Naval Reserve were appointed for duty to the different ships. They worked with the utmost zeal, and their services were greatly valued. It will be noticed with satisfaction that the present Board have decided to enter 2,000 stokers for the Reserve.

An important change was made by the late Board, tending to economy in the non-effective charges, and securing increased efficiency, by retaining men in the prime of life for a longer period in the service. The change in question was the extension of the first term of service in the Navy from ten to twelve years. The training of the Navy was closely watched by the naval advisers of the late Board. With a view to make officers and men more efficient in fleet duties, the admirals on foreign stations were directed to assemble each year as many ships as possible for cruising in a squadron. The results have been satisfactory.

From the *personnel* we pass to the *matériel* of the fleet. By far the greater part of our expenditure is automatic. It represents the pay, the victualling, the pensions of officers and men, and the charge for the maintenance of our large establishments at home and abroad. It is therefore in the building votes chiefly that the distinctive policy of a Government is directly and immediately felt. Viewed in the light of these observations the table on p. 144 affords a clear indication of the course pursued by successive administrations.

Expendi-
ture on
ship-
building

The comparison between the shipbuilding votes in France and England is given in the next table (p. 145), taken from the Navy estimates presented to Parliament in the two countries.

The committee of the Chamber of Deputies on the French estimates for 1886 have given in their report a table prepared by the Ministry of Marine, in which the several items in the shipbuilding votes of France and England are carefully compared. The total amounts are :

					Francs
England	.	.	1884-85	.	97,692,250
			1885-86	.	126,444,575
France	.	.	1886	.	63,054,447

EXPENDITURE ON SHIPBUILDING, 1875-76 TO 1885-86.

Year	Ascertained expenditure on shipbuilding and new machinery, dockyard and contract		Number of men employed on shipbuilding in dockyards at home		Ascertained expenditure on repairs at home and abroad	Number of men employed on repairs in dockyards at home and abroad	Total number of men employed in dockyards at home	Expenditure on naval ordnance (army and navy estimates)	Total expenditure under votes 6 and 10	Total expenditure in shipbuilding and ordnance
	Armoured	Unarmoured	Armoured	Unarmoured						
1875-76	£ 1,058,463	£ 554,755	3,592	1,997	£ 953,677	5,265	15,780	£ 246,189	£ 3,540,092	£ 3,772,601
1876-77	940,318	1,181,642	3,142	3,007	807,656	4,776	16,807	416,865	3,929,846	4,301,711
1877-78	1,948,472 ²	973,970 ²	2,308	3,345	1,069,425	5,413	16,074	369,348	5,123,591	5,458,839
1878-79	631,195	876,854	3,228	2,764	1,064,151	5,471	17,177	507,000	3,810,737	4,289,737
1879-80	631,724	756,883	3,545	2,688	822,220	4,566	16,381	397,000	3,106,563	3,460,563
1880-81	698,798	727,551	4,362	2,206	841,710	4,708	16,894	(211,745) ³	3,082,803	3,425,803
1881-82	949,313	733,187	5,306	2,557	691,080	4,465	17,192	(248,975)	3,318,555	3,736,669
1882-83	990,710	776,304	5,718	2,675	881,810	5,486	18,924	(290,719)	3,472,953	4,156,644
1883-84	1,260,137	669,953	5,922	2,742	929,286	5,888	19,610	(534,695)	3,615,261	4,245,382
1884-85 ¹	1,284,700	699,550	5,193	3,200	958,680	5,803	18,849	(509,429)	3,998,320	4,607,237
1885-86 ¹	1,590,000	1,431,440	5,012	3,277	875,862	5,308	18,702	(512,549)	5,047,320	6,102,652
								(856,908)		

¹ Estimated only.² These amounts include the cost of armoured and unarmoured tonnage purchased out of vote of credit.³ The figures in parentheses do not include cost of ammunition and small arms.

The table on p. 146, also compiled at the Ministry of Marine in Paris from the published estimates, gives the comparative expenditure on building, as distinguished from maintenance and repairs, in France and England for a period of twenty-two years.

Having shown the increase of the shipbuilding votes in the aggregate, it may be asked, 'What were the objects on which the efforts of the late Board of Admiralty were concentrated?' When they took office their special attention was directed to the active exer-

ENGLAND		FRANCE		English and French expenditure
Date	(Votes 6, 10) ¹	Date	(Votes 11, 12, 15, 16, 17, 18, 19, 20, and Budget Extraordinaire)	
	£		£	
1875-76	3,636,538	1875	2,950,000	
1876-77	3,983,605	1876	2,038,880	
1877-78	5,179,601	1877	2,391,910	
1878-79	3,861,317	1878	2,398,758	
1879-80	3,162,622	1879	2,849,860	
1880-81	3,147,585	1880	2,898,112	
1881-82	3,376,484	1881	3,120,899	
1882-83	3,516,216	1882	3,254,569	
1883-84	3,830,633	1883	3,383,346	
1884-85	3,810,105	1884	3,175,357	

¹ The amounts provided in Vote 10 for gun-mountings are omitted.

tions of the French administration in the building of armoured ships. While in completed ships we stood well, anxiety had been aroused by the large number of armoured ships laid down in France. In 1876-80 we had laid down only six ships, and had bought four from the vote of credit for preparations during the Russo-Turkish war. In the same period the French had laid down no less than fifteen ships. To meet this development of construction Lord Northbrook announced in an early speech, as First Lord of the Admiralty, that

I.

L

¹ Estimated only.
 * These amounts include the cost of armoured and unarmoured tonnage purchased out of vote of credit.
 * The figures in parentheses do not include cost of ammunition and small arms.

two ironclads would be laid down in England to every new ship laid down in France. This pledge was observed. In the five years 1880-85, ten ships were laid down in England as against five in France.

DÉPENSES FAITES POUR CONSTRUCTIONS DE NAVIRES ET D'APPAREILS
À VAPEUR.

An- nées	Constructions sur les chantiers de l'Etat		Construction confiées à l'Industrie		Total des dépenses	Year	English expendi- ture : stores, labour, and ma- chinery. Contract and dock- yard
	Navires (coques et acces- soires)	Machines et chau- dières à vapeur	Navires (coques et acces- soires)	Machines et chau- dières à vapeur			
	£	£	£	£	£		£
1864	507,586	134,067	162,656	115,887	920,196	1863-64	1,282,710
1865	635,880	136,140	20,192	81,088	873,300	1864-65	1,674,574
1866	551,748	154,926	72,858	151,816	931,348	1865-66	1,116,198
1867	575,185	105,061	45,877	149,345	875,468	1866-67	1,014,406
1868	564,409	59,516	79,890	93,289	797,104	1867-68	1,800,749
1869	506,434	65,376	53,450	43,520	668,780	1868-69	1,694,362
1870	843,614	158,180	127,989	25,233	655,016	1869-70	1,387,047
1871	292,205	89,862	13,266	16,615	411,948	1870-71	1,330,814
1872	302,638	105,998	7,120	14,076	429,832	1871-72	1,184,172
1873	415,024	101,156	65,611	32,669	614,460	1872-73	800,087
1874	561,758	157,323	24,204	46,399	789,684	1873-74	1,290,028
1875	615,409	161,670	57,776	86,525	921,380	1874-75	1,528,161
1876	709,087	124,073	133,011	88,439	1,054,560	1875-76	1,613,218
1877	788,533	121,478	242,214	149,763	1,301,988	1876-77	2,121,960
1878	843,506	128,944	319,341	210,093	1,501,884	1877-78	2,922,442
1879	765,092	110,196	412,607	216,761	1,504,656	1878-79	1,508,049
1880	792,583	112,849	237,382	232,482	1,375,296	1879-80	1,388,607
1881	722,344	104,014	320,796	197,930	1,345,084	1880-81	1,426,349
1882	774,966	109,358	341,401	174,427	1,400,152	1881-82	1,652,500
1883	851,876	127,455	374,668	205,645	1,559,644	1882-83	1,767,014
1884				Esti- mated	1,536,508	1883-84	1,928,847
1885					1,510,704	1884-85	1,900,000
	12,119,827	2,367,642	3,112,309	2,332,002	22,978,992		34,371,294

¹ Inserted from Estimates.

Policy of
late Board

The policy of the late Board in relation to the construction of armoured ships is indicated clearly by the additional expenditure to which they gave their sanction. The amount appropriated to armoured building and the machinery for ironclads was raised from 634,000*l.* in

1879-80, to 699,000*l.* in 1880-81, 949,000*l.* in 1881-82, 991,000*l.* in 1882-83, 1,260,000*l.* in 1883-84, 1,285,000*l.* in 1884-85, 1,593,000*l.* in 1885-86. In the Estimates for 1885-86 we have a great expansion, in response to a strong popular demand ; but the advance was not considerably greater than in 1881-82, and again in 1883-84, when the Admiralty were but feebly supported by opinion out of doors and in Parliament in their efforts to strengthen the Navy.

The policy of the late Admiralty was, even in its latest phase, consistent with the line which had been taken from the beginning. It was my duty to speak in public from time to time as the representative of the Board ; and while claiming for the Navy that superiority of strength which had been secured by the combined efforts of successive administrations, the necessity for further efforts was insisted upon with a frankness not common in official statements. In a speech delivered at the Colston Hall at Bristol, in November 1881, I said : 'In the present position of affairs the action of the British naval administration must depend mainly on the policy pursued by the French Government. In ships actually ready for sea, our ironclad fleet compares favourably with the French, but this will cease to be the case if armoured shipbuilding in France is continued with the activity displayed since the close of the Franco-German war. Since 1877 the total armoured tonnage launched has been 29,171 tons for the French and 21,704 tons for the British Navy ; and while our Navy Estimates provide 750,000*l.* for armoured construction, the sum provided for the same service in the French estimates is no less than 1,081,000*l.*'

The French made no further addition to their rate of expenditure on ironclads. On our side the expenditure

was increased in the proportions already detailed; and thus we maintained a position which enabled us subsequently to draw comparisons between our armoured Navy and that of France and other Powers, establishing a superiority of force not inadequate to the necessities of our vast empire.

Dimen-
sions and
types of
battle-
ships

Having dealt with the quantity of armoured building as indicated by the appropriation of money for that purpose, we may turn to the question of type. The policy of the late Board with reference to dimensions will be generally approved. Both professional and non-professional opinion is opposed to the construction of vessels of war on the scale adopted in the Italian Navy. Without laying down any arbitrary figure, it is generally admitted that within the limit of from 10,000 to 11,000 tons reasonable requirements can be met. In considering this question of dimensions our policy must be governed by one important consideration. However large the sum of money at our disposal, as we increase in size and cost so we cut down in number; and while the larger ship may have an advantage in thickness of armour, ships of moderate size will have an advantage in the great quality of quick obedience to the helm, and therefore in power of attack with the ram and torpedo.

The armoured ships laid down by the late Board are of five types, represented by the 'Impérieuse,' the 'Admiral' class, the 'Hero,' an exact repetition of the 'Conqueror,' the 'Sans Pareil' and 'Renown,' which may be described as improved 'Conquerors,' and the five belted cruisers. The principal dimensions of the 'Impérieuse' are, length 315 feet, breadth 61 feet, tonnage 7,300. The speed at the measured mile is 17 knots. The 'Impérieuse' carries four 22-ton breech-

loading guns, and a powerful minor armament. As compared with the 'Admiral' class, the disposition of the belt and deck armour is similar, but the thickness is reduced from eighteen to ten inches. The belt in each case extends along more than two-fifths of the length. It protects the machinery and their magazines, and assists in securing the stability and the buoyancy. The armour of the barbette towers in which the heavy guns are mounted protects the loading machinery, and the guns' crews are screened from horizontal fire.

The type of ironclad represented by the 'Impérieuse' was the first new design originated under the late administration. The designs for the 'Admiral' class were considerably advanced under the administration of Mr. W. H. Smith. The 'Colossus,' 'Edinburgh,' and the 'Admiral' class are built on nearly the same lines. These ships have an extreme breadth of 68 feet, as compared with 66 feet in the 'Ajax.' The length has been extended from 280 to 325 feet. With this more favourable proportion of length to breadth, an additional speed of nearly two knots has been obtained without increasing the horse-power. In the 'Admiral' class an important change was introduced in the disposition of the armour. In the 'Colossus' it forms the wall of the citadel. In the 'Collingwood' it is taken away from the central citadel, and formed into separate fixed barbette towers. The towers are placed 140 feet apart, and the guns are 22 feet above the water. The enclosed turrets of the 'Colossus' are 80 feet apart, and the guns are 12 feet above the water. The minor armament forms an important and novel feature in the 'Admiral' class. Between the barbettes and above the true upper deck is a large unarmoured battery, protected by 1-inch steel plating from the fire of

Particulars of new ships

machine-guns, and containing six 6-inch breech-loading guns, fought at ports 14 feet above the water. The battery is protected from a raking fire by winged bulk-heads plated with six inches of steel-faced armour. In this respect the 'Collingwood's' battery resembles the batteries of the 'Nelson' and the 'Shannon.' The crew will be berthed in the upper battery, and will have accommodation infinitely superior to that of any turret-ship. The deck above the upper battery affords ample space for the stowage of boats and for working the ship.

The
'Admiral'
class

The advantages presented by the 'Admiral' type will be best appreciated whenever squadrons are compelled to keep the seas for extended periods. Ships with a low freeboard are too much under water to be reasonably habitable. This disadvantage was brought prominently into view during the cruise of the evolutionary squadron. Steaming to the westward from Berehaven on a summer's night, the fore-deck of the 'Devastation' was swept by sheets of foam, while the upper decks of the broadside ships were towering high above the waves.

In the 'Admiral' class, as in the 'Inflexible,' 'Ajax,' 'Agamemnon,' 'Colossus,' 'Edinburgh,' and new armoured cruisers, the belt armour stops short at the ends, and the protection of vitals is continued by an underwater deck. In the 'Admiral' type, steel-faced deck-plating is for the first time introduced, and the length of the belt is extended from 123 feet, as in the 'Colossus,' to 140 feet.

The weights of armour, including deck armour, are—

	Tons
Ajax	2,223
Colossus	2,364
Conqueror	1,720
Armoured cruiser	1,446
Collingwood	2,548

The heavy guns of the 'Admiral' class are mounted *en barbette*. Various plans were proposed for inclosed turrets. The additional expense involved ranged from 40,000*l.* to 100,000*l.*, and considerable delay would have resulted from any material alterations. The improvements anticipated did not appear to be sufficient to justify the loss of time and the heavy outlay. The introduction of barbettes into our Navy when first proposed led to anxious discussion. It was considered that the additional weight required for the armoured citadel, which is indispensable for the protection of the base of the turret, could be better used in increasing the speed and the coal endurance, and in mounting a greater number of heavy and auxiliary guns. Turret-guns cannot be mounted as high above the water as guns *en barbette*.

The ironclads of earlier design will not require detailed description. The speed of 15½ knots attained in the trials of the 'Conqueror' was most satisfactory. The 'Conqueror' is a valuable addition to the Navy, being well armed and armoured, an effective and handy ram, and a thorough seagoing ship. With their superior manœuvring qualities, such vessels must be formidable in battle, and they will always be required for the general duties of the fleet. The 'Hero,' a repetition of the 'Conqueror,' was laid down in 1883, and has recently been launched.

In April 1885 two improved 'Conquerors' were put out to contract. The 'Sans Pareil' and 'Renown'¹ will have a displacement of just over 10,000 tons. The armour will have a thickness of 18 inches, and the framing behind the armour will be stronger than any hitherto employed. They will carry in a single turret

New
designs

¹ Renamed 'Victoria.'—ED.

two 110-ton guns, the most powerful yet manufactured. An 18-ton gun will be mounted right aft. Twelve 5-ton guns will be carried in the battery, protected with armour proof not only against all machine-guns, but also against the new 6-pounder shell-guns. The estimated speed is $15\frac{1}{2}$ knots.

Belted
cruisers

The belted cruisers formed the most novel and important feature in the extended programme of building commenced under the late Board in the present financial year. The belted cruiser is a ship of about 5,000 tons displacement, and 3,000 tons weight of hull, including 1,000 tons of armour. The water-line being protected by 10-inch armour, or a belt deck from end to end, and the conning tower being strongly armoured, the belted cruiser may fairly be reckoned with many ironclads in foreign navies. The guns will be two of 18 tons and twelve of 5 tons, with machine guns. The estimated speed is 17·5 knots. The coal supply will be sufficient for 2,000 knots at full speed, and 8,000 knots at 10 knots. We might have produced a ship with higher speed, but only by sacrificing protection or increasing dimensions. Five of this type were ordered by contract in April 1885.

Armoured
belts

During the administration of the late Board of Admiralty, a difficult question was raised by Sir Edward Reed. For the defence of the water-line he asked for a greater length of armoured belt. Sir Nathaniel Barnaby preferred a system of protection by cellular subdivision. These eminent authorities are at issue—not on a point of principle, but as to the extent to which an accepted principle should be applied. While the arguments in favour of the design adopted in the case of the 'Collingwood,' and other ships of the 'Admiral' class, are powerful and cogent, we may expect to see an exten-

sion of the belt in any new ships which may be laid down in the future.

The trials of our recent ships at the measured mile Speed have been eminently satisfactory. The speed has never yet been approached by that of any armoured ships. The French have not produced as yet any ironclad ships with speed exceeding 15 knots. Our six first-class battle-ships of the 'Admiral' type steam more than 16 knots at the measured mile. The powerful cruisers 'Impérieuse' and 'Warspite' may be reckoned as 17-knot ships under the same favourable conditions; and they again will be surpassed by the five belted cruisers, which on their trials will be nearly 18-knot vessels.

Having accelerated greatly the armoured construction, the late Board in the earlier years of their administration did not feel justified in pressing for a similar increase of expenditure on the unarmoured ships. Unarmoured ships In the Estimates of the present year, the expenditure proposed for unarmoured building was advanced to 1,431,000*l.*, or nearly double the average of the eight preceding years. Commencing their task under the conviction that in point of expenditure they must be content to work within the limits accepted by their predecessors, their attention was concentrated on improvement of type. In cruisers, high qualities of speed and coal endurance are indispensable. In these important points the British Navy was sensibly inferior to the French. In 1880, of ships capable of steaming 14 knots we possessed only eleven; the French had twenty-five.

In the period 1868-84 twenty-six cruisers were Want of speed launched for the British Navy, ranging in dimensions from 1,860 to 2,380 tons. Of this large fleet two only, the 'Cleopatra' and 'Comus,' attained the speed of 14 knots on the measured mile. In the same period the

French launched eight cruisers of a similar class ; but the measured mile speed in all cases was a knot in excess of the English results. The want of speed in the British Navy was due to the attempt to combine the qualities of a sailing ship and a steamer with a heavy weight of metal. An unsatisfactory compromise was the inevitable result. The continued construction of gun-vessels without speed has given us a large number of craft of little value except to show the flag. On distant stations, where the Navy should at all times be in a position to give protection to commerce, we have numerous vessels in commission with a speed ranging from 9 to 11 knots on the measured mile, and with a coal endurance at full speed of from two to two and a half days.

Iris' and
'Mercury'.

A new and a better policy in unarmoured construction was adopted by the Admiralty of 1874-80. They began by building the two despatch vessels 'Mercury' and 'Iris' with a speed not approached up to that date in any naval service. In the 'Mercury' and the 'Iris' the speed was obtained by an enormous development of horse-power. The defensive arrangements were but little superior to those of a cruiser from the mercantile marine. The cost per ton was equal to that of the most powerful ironclad, while the fighting power was inconsiderable. As a fighting ship, the most appropriate function of the 'Mercury' would be that of a torpedo-boat catcher. It was in this service that the ship was employed in the experimental squadron under Admiral Hornby. The 'Polyphemus' was another bold experiment in the class of ocean-going torpedo boats. The 'Leander' also was the forerunner of a new and valuable type which we owe to the same administration.

The late Board were deeply impressed with the

necessity for developing the construction of vessels of the 'Leander' and 'Polyphemus' types. They cut down top hamper, and took advantage of the recent advance in gun construction to reduce considerably the weights of armaments while adding greatly to their power. The new designs were much more favourable to high speed. The recent shipbuilding policy in relation to unarmoured vessels may be traced in the enumeration of the ships laid down. Of vessels steaming 16 knots and over, one only was laid down in each of the years 1875, 1876 and 1878. In 1880 three ships were laid down, and in each of the years 1881-83 one ship of this class. The number was increased by a rapid stride to seven in 1884, and to twelve in 1885. By the steady development lately given to the construction of fast ships, we have now established a decided superiority over the cruisers of any other Power.

Improved
cruisers

Passing from numbers to type, the first four ships of a large class laid down for the protection of commerce under the late Board were of the 'Leander' type. These ships were followed by the four ships of the 'Mersey' type, with an estimated speed of 17 knots, which will probably be exceeded. In the smaller unarmoured vessels, such as corvettes and sloops, the speed was advanced from the 10 knots previously accepted to an average of not less than 13 knots. Taking the important types in detail, the 'Mersey' may be described as a twin-screw steel corvette protected by an under-water armoured deck extending right through the ship, and varying in thickness from two to three inches. By this deck and by internal subdivision buoyancy and stability are secured. The 'Mersey' is of the same general type as the 'Leander,' and has the same principal dimensions and the same form under

water, except as modified to give a ram bow and to keep the machinery below the protected deck. Unlike the 'Leander,' the 'Mersey' will have no rig, but only two pole masts for signalling. The speed expected under forced draught is about 17 knots, practically the same as the 'Leander's.' The 'Mersey' class will be armed with two long 8-inch armour-piercing guns, of a new type. The armament is completed with ten 6-inch guns, which are also capable of piercing armour of moderate thickness.

Torpedo
flotilla

Having dealt with the protection of commerce, we had to take in hand the construction of a torpedo flotilla. The 'Scout' class was first introduced into the building programme in 1884. This vessel is in many respects an enlarged torpedo boat, intended to keep the sea in all weathers, and to guard our commercial marine. The displacement is 1,450 tons; the armament consists of eleven¹ separate torpedo-ejectors. The speed is over 17 knots. Nine vessels of this type and two despatch vessels, which would be made available for the same purpose, have been laid down.

Small
vessels

For the police of the seas the late Admiralty accepted the 'Heroine' type, of which seven were laid down. The displacement of these vessels is 1,420 tons. The speed under steam on the measured mile equals that of the large 'C' class, while the cost is 72,000*l.* in the 'Heroine,' against 118,000*l.* in the 'C' class. As cruisers under canvas the less costly vessels have a great advantage. Among the smaller craft laid down by the late Board, the 'Curlew' and the 'Landrail' deserve mention. They are gunboats of a type entirely new in our service. Their displacement is only 785 tons, and their estimated speed 14 knots. Their steaming

¹ Since reduced to seven — ED.

distance at 10 knots will be 6,000 miles. They will be well armed with torpedoes and breech-loading guns.

In addition to the flotilla of torpedo cruisers, fifty-four first-class seagoing torpedo boats, 125 feet long, and of 19 knots speed, were laid down in 1885. If war had been declared with Russia, and our squadron had been sent to the Baltic, these boats would have been required to defend our ships from torpedo attacks. Immediately on an outbreak of hostilities the Russian men-of-war would have been withdrawn into the basins of Cronstadt and Sveaborg, secured from attack, whether by torpedo boats or by ironclads, behind an impassable barrier of booms and obstructions, and under the protection of stone and iron-plated batteries bristling with powerful guns. Meanwhile what would have been the position of the British blockading squadron? Our ships, being compelled to keep the sea, would have been exposed to attack on every favourable opportunity of fog or darkness. We were anxious to devise the best means for giving protection to a squadron placed in so hazardous a situation. The best opinions were unanimous in favour of surrounding the ironclads with a cordon of torpedo-boat catchers. The boats required were similar to torpedo-boats in all respects except as to armaments. For the duty assigned to them of defending large ships against swift and puny antagonists, offering a small and rapidly moving target very difficult to hit, the armament proposed was to consist, not of torpedoes, but of powerful quick-firing and machine-guns. These torpedo-boat catchers will now be utilised for defensive purposes. They will be distributed to the several naval stations and commercial harbours at home, and to the coaling stations abroad, and they will be armed with the torpedo.

Torpedo
boats

Defence
against
torpedo
boats

Rapidity
of con-
struction

In connection with the subject of shipbuilding some allusion will be appropriate to the efforts lately made to accelerate the construction of ships. The delays in completion have given occasion for much unfavourable comment. These delays have occurred chiefly in the later stages of advancement, and are mainly attributable to those demands of the Navy for perfection which it must always be difficult and often unwise to refuse. Considerable pressure has been used to hasten completion without sacrificing efficiency, and in a comparative sense not unsuccessfully. Not a single ironclad laid down by the French during the term of office of the late Board has yet been launched. Of the British ships commenced within the same period, two, the 'Impérieuse' and the 'Warspite,' are nearly completed. The 'Howe,' the 'Rodney,' the 'Benbow,' 'Camperdown,' and 'Hero' have been launched. The 'Hero' was less than two years on the stocks. Another recent instance may be quoted of rapid construction in the smaller class: the 'Icarus,' of 950 tons, was laid down at Devonport in August 1884; she was in frame in six weeks, and launched in July last.

Merchant
cruisers

The policy of the late Board in dealing with the reserves of cruisers in the mercantile marine deserves notice. It has been stated that until recently no increase had taken place in the amount of unarmoured tonnage annually built. There was no reason to anticipate that in a time of profound peace public opinion would have been prepared to accept such an increase in the Navy Estimates as was proposed for 1885-86. Assuming that the administration must be content to make the best use of a limited sum of money, our efforts were concentrated mainly on vessels of a class which could not be obtained from any source external to the Navy

itself. It is obvious that for ironclads we must depend entirely upon special construction for naval purposes. For the defence of our commerce against fast merchant steamers, taken up by an enemy and converted into cruisers, vessels of a similar class might be selected from our mercantile marine. The views entertained by the Board were, it is believed, very fairly conveyed in a speech delivered at Birkenhead by the present writer in December 1882. In insisting upon the intimate connection between the fighting Navy and the mercantile marine, it was said: 'Your shipbuilding yards may be regarded as so many supplementary dockyards. Your powerful steamers become transports or cruisers. Your seamen and engineers are an inexhaustible reserve for the Navy. Unless we could rely on the mercantile marine to help us, it would be impossible to accept the responsibility of protecting our commerce with the present Estimates, or indeed with any Estimates which Parliament could be induced to vote.'

It was an essential part of the policy of the late Board to carry on the work begun by their predecessors, to organise a reserve of cruisers in the merchant service, and gradually to provide suitable armaments. Our reliance upon the mercantile marine was fully justified on a late occasion. We were able to take up at a few days' notice a powerful fleet of ocean steamers. Of these vessels, the 'Oregon' was actually commissioned as a ship of war, and formed part of the fleet commanded by Sir Geoffrey Hornby. The many useful services which our mercantile auxiliaries could render even to a fleet of ironclads were clearly shown in the course of the cruise. While claiming a high value for our improvised frigates as look-out ships to squadrons, or for the protection of commerce against privateers, it will

Action of
Admiralty

be admitted that in vessels specially built for war internal subdivision and the protection of the machinery and boilers can be carried further than would be possible in ships designed for the purposes of trade. By the recent increase of the Estimates we were enabled to give to our unarmoured construction that development which had been from the first manifest in our programme of armour construction.

Naval
armaments

Having dealt with the ships, we must notice their armaments. In the financial year 1879-80 not a single breech-loading gun of the heavier calibres was mounted in a British ship of war. The whole subject of naval ordnance was under examination by a committee. Their inquiries resulted in a recommendation in favour of the breech-loading system, which the Admiralty lost no time in adopting. It involved a complete re-armament of the Navy, and a heavy additional charge on the Estimates. The expenditure on ordnance in the three years 1878-81 averaged 444,000*l.* The expenditure for the three succeeding years averaged 775,000*l.* In 1885 a further advance was made to 1,399,000*l.*, being an increase of more than a million per annum upon the expenditure for similar purposes during the two years 1879-80.

Criticism of the armament of the British Navy has been severe. Delay has not been due to prejudice in favour of any particular system, or to want of determination in pushing forward essential improvements on the part of the Parliamentary administrators who have been from time to time charged with the management of the Navy. The naval service hesitated to accept the complications and risks of the breech-loading system as applied to heavy ordnance. The hesitation would probably have continued but for the introduction of the

slow-burning powder, the full results from which can only be obtained by greatly lengthening the guns. We are now pushing the construction of guns on a scale not approached by any other Power.

The committee on the French estimates for 1886 gives comparative tables of penetration for English and French guns, from which the figures immediately following are extracted. While admitting that our calculated results are superior, the committee expresses the belief that in practice the guns of the two navies of corresponding dates are approximately equal.

English
and French
guns

COMPARATIVE PENETRATION TABLES FOR BRITISH AND
FRENCH NAVAL ORDNANCE.

—	Calibre	Penetration of armour at point-blank range
	Inches	Inches
English . . .	6	10.23
French . . .	6.45	9.05
English . . .	9	21.26
French . . .	9.44	18.11
English . . .	12 (43-ton)	25.59
French . . .	13.38	25.98
English . . .	13 (63-ton)	38.18
French . . .	13.38	29.92

In the criticisms of the naval administration of the late Board, the neglect of the *torpedo* was a prominent topic. The reasons for hesitation in the expenditure of large sums on the torpedo are not far to seek. The Admiralty had made a great advance in the extent of armoured construction. They were doing much to improve the armoured fleet. The necessity for rapid progress in building more boats was not regarded as urgent. In a period of transition the Admiralty could not put out

Sphere of
torpedo
boats

Limited to
coast
defence

of view the great resources at the disposal of a British administration for the rapid construction of torpedo boats in case of emergency. Ironclads, on the other hand, could not, it is obvious, even with the most lavish expenditure, be produced in a short space of time. The multiplication of torpedo boats elsewhere did not necessarily require a corresponding construction for ourselves. Mere torpedo boats are the arm of the feeble; they are efficient chiefly for defensive purposes. The torpedo boats in the Gulf of Finland are a good defence for the Russian ports. They could not be sent across the sea, or threaten the coasts or the commerce of this country. The writer accompanied the squadron commanded by Admiral Hornby on its cruise round the coast of Ireland, and had, as an eye-witness, an opportunity of seeing the behaviour of the torpedo boats at sea. The difficulties experienced in bad weather fully proved that the sphere of action of mere torpedo boats is limited to coast defence. These results fully vindicate the policy of the late Board of Admiralty. When they were enabled to propose a large increase of construction for 1885-86, the programme was sharply criticised on the ground that more attention should have been given to torpedo boats. The Admiralty were of opinion that the provision of sea-going torpedo cruisers was, in the circumstances with which they had to deal, a more urgent necessity. Their programme included sea-keeping vessels represented by the 'Scout' or 'Archer' class. Seven were to be laid down in the present year. Two had been commenced in 1884. These vessels, combined with the 'Polyphemus,' form the first instalment of a most powerful and efficient sea-going torpedo flotilla.

The proceedings of the late Administration in dealing with building and armaments having been described in

detail, the adequacy of the efforts put forth may be gauged by comparing our available strength with that of our most formidable rival on the seas.

The following description of the French Navy is taken from the Report of the Select Committee of the Chamber of Deputies on the Estimates for 1884 :

‘ We possess at this moment, exclusive of ships in construction, ten effective sea-going ironclad battle-ships. Four are in commission, namely, the “Admiral Duperré,” the “Dévastation,” the “Colbert,” and the “Suffren.” One ship is complete for sea. Five are under repair. Of these ironclads, seven are of the old type—the “Colbert,” the “Friedland,” the “Marengo,” the “Océan,” the “Richelieu,” the “Suffren,” and the “Trident.” All except the “Friedland” are wood-built and without water-tight compartments. Our fleet of completed ironclads includes in addition five cruisers and four coast-defence ships. The cruisers are deficient in speed. The coast defence vessels are less open to criticism. The ironclad fleet in construction comprises thirteen ships with a speed somewhat superior to that of the majority of the completed battle-ships, two armoured cruisers, two coast-defence ships, and eight armoured gunboats. The latter are intended for coast defence, but would be much less effective than torpedo boats. If the use of the torpedo did not tend in a great measure to neutralise the armoured strength of maritime Powers, we should regard our ironclad fleet as absolutely insufficient.

‘ It is not true to say that we have not a single cruiser ; but the truth—and it is painful enough—is that we have four, the “Duquesne,” the “Tourville,” the “Milan,” and the “Hirondelle,” two being of the first class, one of the second, and one of the third. A fifth, the “Sfax,” is approaching completion. Of our fast cruisers, built and

French
Select Com-
mittee on
the Navy

building, the "Sfax" and the three others of the same type alone combine those conditions of unsinkability which are required in a ship of war. The insufficiency of our fleet in fast cruisers is therefore obvious. It should be remedied as soon as possible.

Useless
small craft

'We do not think it necessary to refer in detail to other types largely represented in our Navy list. All these ships are a *sorte de poussière navale*, constructed to meet the requirements of our extended colonial empire, and, if useful for the maintenance of order in our Indo-Chinese and other territories, they add nothing to the strength of our Navy. It might even be said that they tend to weaken it by absorbing a part of its resources. We want some *modus vivendi*, some plan for defraying the cost of maintaining order and security in our great possessions out of local revenues, reserving exclusively for the fleet the appropriations derived from the Navy estimates.'

Torpedo
boats

The committee report that at the present time there are in the French Navy sixty-four torpedo boats complete, of which twelve are of the first class, and forty-three of the second class, with four torpedo vedette boats. They have in construction eight torpedo sloops, nine sea-going torpedo boats, and four torpedo cruisers. They recommend that at least one hundred additional torpedo boats should be provided for the defence of the naval ports, and an equal number for the general defence of the coast of France.

Having quoted the latest official opinion on the strength of the French Navy, a few statistics may appropriately be added which will supply the most important data upon which an independent judgment may be formed.

The following tables give a summary of the present

and prospective condition of the armoured fleets of France and England :

Summary
of English
and French
ironclads

ARMOURD SHIPS.

1885					
ENGLAND			FRANCE		
Class	Ships	Displacement	Class	Ships	Displacement
1st . .	13	122,010	1st . .	3	29,860
2nd . .	14	86,310	2nd . .	12	86,030
3rd . .	14	112,410	3rd . .	13	61,800
Coast defence	14	41,530	Coast defence	12	34,200
Total .	55	362,260	Total .	40	211,890

1890					
ENGLAND			FRANCE		
Class	Ships	Displacement	Class	Ships	Displacement
1st . .	22	210,450	1st . .	10	103,140
2nd . .	22	132,730	2nd . .	18	125,920
3rd . .	12	98,380	3rd . .	4	19,630
Coast defence	14	41,530	Coast defence	19	42,080
Total .	70	483,090	Total .	51	290,770

The ships included in the first and second classes are shown in the tables, pp. 166, 167.

The ships of the third class are of obsolete type, but all the English ships are iron built, and solidly constructed. The British coast defence list includes five small turret-vessels permanently stationed in colonial waters, the 'Glatton,' and four ships of the 'Gorgon' class, well adapted for the defence of our commercial harbours.

The French coast defence list comprises three vessels

Comparative Statement of the Armoured Fleets of France and England, March 31, 1890.
SHIPS COMPLETED.

TABLE I.—FIRST CLASS. HULLS OF IRON. ARMOUR NOT LESS THAN 9 INCHES. DISPLACEMENT EXCEEDING 8,500 TONS

ENGLAND						FRANCE					
Name	Displacement	Speed	Maximum Armour	Armament (Heavy)	Date of Launch	Name	Displacement	Speed	Maximum Armour	Armament (Heavy)	Date of Launch
Devastation	9,330	13.84	14	4 35-ton M.L.	1871	Amiral Duperré	10,900	14.47	21½	4 43-ton	1879
Dreadnought	10,820	14.52	14	4 38 "	1875	Dévastation	9,930	15.17	15	4 48 "	1879
Inflexible	11,880	14	24	4 80 "	1876	Redoutable	9,080	14.66	14	4 28 "	1876
Neptune	9,310	14.2	13	4 38 "	Purchased in 1878	Foudroyant	9,480	15	15	4 49 "	1882
Thunderer	9,330	13.40	14	2 38 "	1872	Amiral Baudin	11,200	15	21½	3 75 "	1883
Alexandra	9,490	15	12	2 25 "	1875	Formidable	11,200	15	21½	3 75 "	1885
Hercules	8,680	14.69	9	8 18 "	1868	Neptune	10,400	15	18	4 52 "	"
Sultan	9,290	14.13	9	4 12 "	1870	Hoche	10,200	15	18	2 52 "	"
Téméraire	8,540	14.65	11	4 25 "	1876	Marceau	10,400	15	18	4 52 "	"
Superb	9,170	13.8	12	16 18 "	Purchased in 1878	Magenta	10,400	15	18	4 52 "	"
Ajax	8,510	13	18	4 38 "	1880						
Agamemnon	8,510	13	18	4 38 "	1879						
Edinburgh	9,150	16	18	4 43-ton B.L.	1882						
Colossus	9,150	16	18	4 43 "	1882						
Collingwood	9,150	16	18	4 43 "	1882						
Howe	9,600	16	18	4 64 "	1885						
Rodney	9,600	16	18	4 64 "	1884						
Benbow	10,000	16	18	2 110 "	1885						
Camperdown	10,000	16	18	4 64 "	"						
Anson	10,000	16	18	4 64 "	"						
Sans Pareil	10,470	16	18	2 110 "	"						
Renown	10,470	16	18	2 110 "	"						
Total, 23.	210,450					Total, 10	103,140				

¹ Renamed 'Victoria.'—Ed.

TABLE II.—SECOND CLASS. HULLS OF IRON (I.) OR OF WOOD (W.).
MAXIMUM ARMOUR NOT LESS THAN 8 INCHES. DISPLACEMENT LESS THAN 8,500 TONS.

ENGLAND							FRANCE						
Name	Dis- place- ment	Speed	Maxi- mum Armour	Armament (Heavy)	Date of Launch	Hulls	Name	Dis- place- ment	Speed	Maxi- mum Armour	Armament (Heavy)	Date of Launch	Hulls
Monarch . .	8,320	14.94	10	4 25-ton M.L.	1868	I	Colbert . .	Tons	Knots	Inches	8 23-ton	1875	W.
Andacious . .	6,010	12.83	8	10 12 "	1869	I	Trident . .	8,450	14.4	8½	8 23 "	1876	W.
Belleisle . .	4,870	12.20	12	4 25 "	1876	I	Richelieu . .	8,670	14.25	8½	6 23 "	1873	W.
Invincible . .	6,010	14.09	8	10 12 "	1869	I	Friedland . .	8,770	13.4	8½	8 23 "	1873	I.
Iron Duke . .	6,010	13.64	8	10 12 "	1870	I	Marengo . .	7,750	12	8½	4 23 "	1869	W.
Nelson . .	7,630	14.05	9	4 18 "	1876	I	Suffren . .	7,620	14.30	8½	4 23 "	1870	W.
Northampton	7,630	13.17	9	4 18 "	1876	I	Océan . .	7,650	13.70	8½	4 23 "	1868	W.
Swiftsure . .	6,910	13.75	8	10 12 "	1870	I	Bayard . .	5,890	14.55	10	4 15½ "	1880	W.
Triumph . .	6,640	14.07	8	10 12 "	1870	I	Turenne . .	5,790	14.14	10	4 15½ "	1879	I.
Orion . .	4,870	13	12	4 25 "	1879	I	Fulminant . .	5,500	12	13	2 28 "	1877	I.
Shannon . .	5,390	12.35	9	2 18 "	1875	I	Tonnerre . .	5,500	12.3	13	2 28 "	1875	I.
Hotspur . .	4,360	12.65	11	2 25 "	1870	I	Vauban . .	5,780	14	10	4 18½ "	1882	I.
Impérieuse . .	7,600	16	10	4 18-ton B.L.	1883	I	Terrible . .	7,100	14.50	19½	2 75 "	1881	I.
Warspite . .	7,600	16	10	4 18 "	1884	I	Furiex . .	5,600	12	17½	2 47 "	1883	I.
Conqueror . .	6,220	15	12	2 43 "	1881	I	Indomptable	7,100	14.50	19½	2 75 "	1883	I.
Rupert . .	5,440	13.59	14	2 18-ton M.L.	1872	I	Duguesclin . .	5,780	14	10	4 18½ "	1883	I.
Hero . .	6,220	15	12	2 43-ton B.L.	1872	I	Caiman . .	7,100	14.50	19½	2 75 "	1885	I.
Belted cruisers	5,000	18	10	2 18 "		I	Requin . .	7,100	14.50	19½	2 75 "		
	5,000	18	10	2 18 "		I							
	5,000	18	10	2 18 "		I							
	5,000	18	10	2 18 "		I							
Total, 22 . .	132,730						Total, 18 . .	125,900					

of greater power than any British ships in the same class :

Name	Displacement	Speed	Maximum Armour	Armament (Heavy)	Date of Launch	Hulls
	Tons	Knots	Inches	Tons		
Tonnant .	4,630	10	17 $\frac{3}{4}$	2·47	1880	} Iron
Tempête .	4,450	11·75	13	2·28	1876	
Vengeur .	4,450	11	13	2·48	1878	

The French list includes in addition eight armoured gunboats, four having a displacement of 1,030 tons, and four of 1,610 tons.

The fast unarmoured ships of France and England, built and building, are shown in the tables on p. 169.

Defence of
coaling
stations

The defences of our coaling stations have occupied the attention of successive Governments. They have shrunk from undertaking the task, under an apprehension of the enormous expenditure to which they might find themselves committed. Looking at the experience of the past, such apprehensions cannot be regarded as altogether without foundation. The fortifications of our home ports have involved an expenditure of many millions, and a visit to Bermuda cannot fail to impress the traveller with the conviction that the defensive works have been unduly extended. To man them properly, a garrison of at least 6,000 men would be required. The permanent force in time of peace is 1,600 men, and it may be questioned whether a sufficient addition to the strength could be spared, even under the apprehension of war. The Royal Commission on our Colonial Defences arrived at the conclusion that a comparatively moderate sum would suffice to place all our foreign stations in a position of defence against the attacks of the light vessels of an enemy. It is certain that we have nothing

ENGLAND.

16 to 17 knots	Speed	Tons	Total Tons	17 to 18 knots	Speed	Tons	Total Tons	18 and over	Speed	Tons
Instantant	16	—	5,780	Polyphemus	17	—	2,640	Mercury	18	3,755
Raleigh	16	—	5,200	Iris	17	—	3,750	Torpedo ram	18.5	2,800
2 Scouts	16.5	1,430	2,860	C Alacrity and Sur-prise	17	1,400	2,800			
4 Leaders	17	3,780	15,000	B 4 Merseys	17	3,550	14,200			
B 7 Archers	16.5	1,600	11,200							
			40,040				23,390			6,555

B, building; C, completing.

FRANCE.

16 to 17 knots	Speed	Tons	Total Tons	17 to 18 knots	Speed	Tons	Total Tons	18 knots and over	Speed	Tons
Duquesne	16	5,883	5,883	(a) 4 Condor	17	1,260	5,040	Milan	18	1,546
Tourville	16	5,507	5,507	(a) 8 Bombe	17	321	2,568			
Building (Sfax	16	4,503	4,503							
and com-pleting (Aréthuse	—	2,356	2,356							
(Dubourdieu	—	3,354	3,354							
		21,603	21,603				7,608			1,546

(a) Building and completing.

to fear from their ironclads. Having regard to the limited number of such vessels at their disposal, no European Power could venture to weaken the means of home defence in time of war by sending fleets of ironclads to distant quarters of the globe. The public have now the assurance that the necessary works for our coaling stations have been taken in hand. The charge on imperial funds can be kept within reasonable limits. The cost of permanent fortifications will be borne by the wealthy communities established under the protection of our flag at Hong Kong and Singapore. The Australian colonies are fully prepared to provide their own local defences. We look for assistance from India for the fortification of Aden. At the Cape, Malta, and Gibraltar the charge must necessarily be borne by the Imperial exchequer. In connection with these works of defence the patriotic efforts of our most powerful colonies to create a naval force deserve attention. They already possess ironclads, torpedo vessels, and powerful sea-going boats, and they have organised a considerable naval reserve. The late Admiralty readily afforded all the assistance which it was in their power to give to the colonial governments.

Docks
abroad

Under the late Board the dock accommodation for the Navy was considerably extended. They completed a dock of the first class at Devonport, and they commenced a similar dock at Malta. They obtained the sanction of the Treasury for a grant towards the construction of a private dock at Hong Kong, large enough to take in ironclads of the most powerful class which would be despatched to those distant waters. They assiduously represented to the Government of India the necessity for providing a dock at Bombay capable of receiving an ironclad.

Finally, in the anxious desire to arouse public opinion, and to bring pressure to bear upon the Government, accuracy has been too little regarded in the comparisons of our Navy with foreign fleets from time to time presented to the public. Happily these pessimist views are not accepted abroad with the credulity which is exhibited at home. Foreign observers know well that we are not defenceless, and they have a wholesome respect for our naval power. This impression is our best protection against the miseries of war. In recent years the naval debates in Parliament have been free from the acrimony formerly displayed. The discussions in the House of Commons on naval matters were lifted out of the region of party conflict. It was agreed on both sides to treat the affairs of the Navy as a common object in which, if the rivalry of party was to be felt at all, it should be displayed not in mutual recrimination, but in striving which would contribute most from his stores of knowledge and experience for the advantage of the public service.

Undue
depreciation
of
our fleet

The permanent strength of the Navy must ever depend on the will of the nation. No movement such as that which has lately taken place could proceed from the action of a particular party or the influence of an individual minister. Lord Beaconsfield said truly: 'It is quite a wild idea that a body of men, though they may be ministers, can meet in a room and suddenly alter the establishments of the country. . . . The establishments of the country are adapted to the policy which the country pursues.'

Influence
of the
public

Under the late Administration the building votes were increased from 3,082,000*l.* in 1880-81 to 5,047,000*l.* in 1885-86. They were increased because at the bidding of the nation we entered upon a new policy. We have

undertaken to provide upon a scale never contemplated before for the protection of the commerce of the country. We have resolved on a complete re-armament of the fleet.

Tribute
to past
Admini-
stration

In asking for a full and fair recognition of the strength and resources of the Navy as it was handed over by the late Government to their successors, the present writer disclaims any special share of credit for the Board with which he was connected. The strength of the Navy as we see it to-day, in its officers and men, in its ships, in the great stations and establishments which it possesses in all parts of the world, is the result of the labour of a long succession of Boards of Admiralty, and it is intimately bound up with the history of the country. The ablest ministers in a short and precarious term of office can add but little to our maritime power: a short interval of bad administration may sensibly weaken it.

A thousand years scarce serve to form a State :
An hour may lay it in the dust.

It may be confidently asserted that under the late Board of Admiralty much was done to maintain the traditional superiority of the British Navy.

XVI

THE BRITISH NAVY

LETTER TO THE 'TIMES,' MAY 25, 1888

AROUSED and guided by naval authorities of great distinction, public attention is once more turned to the state of the national defences. A just appreciation of our requirements cannot be formed without a knowledge of the leading facts.

And first let us deal with the protection of commerce, the vital importance of which to the British Empire is shown in the statistics of tonnage of the mercantile navies of the world.

TONNAGE OF MERCHANT VESSELS, SAILING AND STEAM, IN 1886.

—	Germany	France	Italy	United States	United Kingdom
Sailing . .	830,789	492,807	801,349	1,673,605	3,396,516
Steam . .	453,914	500,484	144,328	1,346,351	3,965,302
	1,284,703	993,291	945,677	1,673,605	7,361,818

Mercantile
marine of
certain
countries

Having compared the merchant fleets, let us review the resources available for their protection. France and England being the only Powers which have bestowed special attention upon the construction of fast un-armoured cruisers, we may confine ourselves to an enumeration of the vessels under the respective flags of those countries. In the following tabular statement the torpedo flotilla is omitted on both sides :

UNARMoured SHIPS.

*England.*Fast
English
and French
cruisers

Name	Displace- ment	Date of Launch	Armament	Speed
	Tons			Knots
Blake . . . }	9,000	Building	Not yet decided	22
Blenheim . . . }				
Vulcan . . . }	6,620	Building	{ Eight 36-pr. guns, 12 3-pr. quick-firing guns }	20
Medusa . . . }				
Medea . . . }	2,800	Building	{ Six 6-in. guns, 10 quick-firing guns }	20
Magicienne . . . }				
Marathon . . . }	2,950	Building	{ Six 6-in. guns, 10 quick-firing guns }	19.75
Melpomene . . . }				
Barham . . . }	1,800	Building	{ Six 36-pr. guns, four 3-pr. quick-firing guns }	19.5
Bellona . . . }				
Iris . . . }	3,730	1877	{ Ten 64-pr. M.L.R. guns }	17.08
Mercury . . . }				
Severn . . . }	3,550	1878	13 5-in. B.L. guns	18
Thames . . . }		1885	Two 8-in. 15-ton guns	18.17
Forth . . . }		1886	Ten 6-in. B.L.R. guns	18
			{ Three quick-firing 12 M. guns }	18

France.

Name	Displace- ment	Com- menced	Armament	Speed
	Tons			
Chanzy . . . }	3,027	1887	{ Four 16-cm. 5-ton B.L.R. Four quick firing. 6 M. }	20
Davoust . . . }				
Suchet . . . }				
Alger . . . }	4,160	1887	{ Four 16-cm. 5-ton B.L.R. Six 14-cm. 3-ton B.L.R. Four quick-firing. 6 M. }	19
Dupuy de Lôme . . . }		1888		
Isly . . . }		1887		
Jean Bart . . . }		1886		
Mogador . . . }	4,325	1887	{ As above Six 16-cm. 5-ton B.L.R. Ten 14-cm. 3 ton B.L.R. Three quick-firing. 10 M. }	19
Cecile . . . }				
Cœtlogon . . . }	1,550	1887	{ Two 14-cm. 3-ton B.L.R. Three quick-firing. 4 M. Five 10-cm. or 30 prs. }	19.50
Cosmao . . . }		1887		
Lalande . . . }		1887		
Surcouf . . . }		1886		
Tronde . . . }		1886		
Milan . . . }	1,540	1881		18

It is to be noted that the fast vessels now building for the French Navy were commenced in 1886 with three of the ships enumerated in the above list. The remainder were all laid down in 1887, a supplementary grant of 1,000,000*l.* having been voted by the French Chamber.

The recent great development in the construction of swift and powerful cruisers must be attributed to Admiral Aube. It was his policy to wage war against commerce, and to meet ironclads with the torpedo flotilla.

Returning to the British unarmoured vessels, the list of ships of 17-18 knots speed includes the 'Polyphemus,' four fine cruisers of the 'Leander' type, of 3,750 tons, four 'Archers,' of 1,630 tons, and the 'Alacrity' and her consort, of 1,400 tons.

The following summary may now be given :

British			French	
Speed	Ships	Total Displacement	Ships	Total Displacement
Knots		Tons		Tons
Over 20	5	30,220	3	9,081
19-20	5	12,450	11	35,981
18-19	5	18,110	1	1,540
17-18	13	30,240	4	5,120
16-17	10	24,670	3	15,888
15-16	4	15,490	8	15,670

Summary

Having dealt with the defence of commerce, we turn to the armoured fleet. In the tables prepared by Mr. Barnes for the 'Naval Annual,' the British armoured ships of the first and second classes are given as 48 in number, of an aggregate tonnage of 377,580 tons. The French Navy has 28 armoured vessels, of an aggregate tonnage of 231,515 tons.

Comparison of armoured fleets

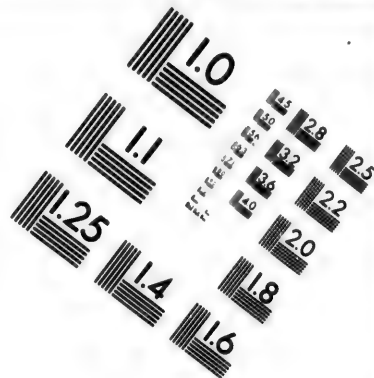
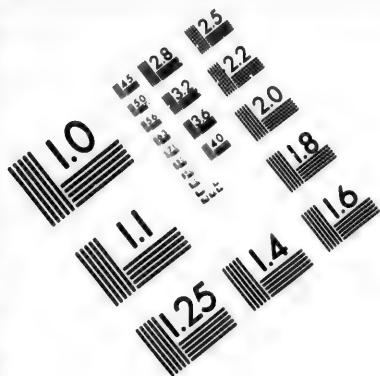
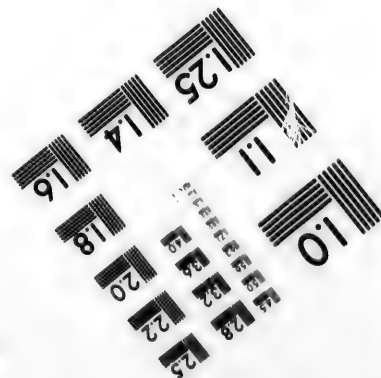
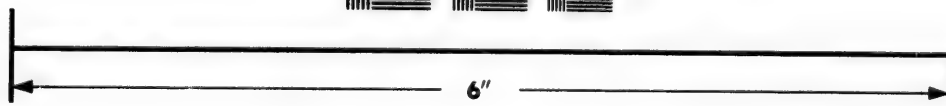
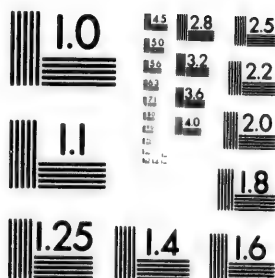
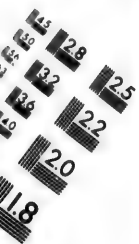


IMAGE EVALUATION TEST TARGET (MT-3)



**Photographic
Sciences
Corporation**

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503



In the large ships of the first period of armoured building we have a marked superiority over the French. An advantage in this class is comparatively unimportant. In the coast-defence class we have nothing to match the French 'Tonnant' and 'Vengeur,' of 4,707 tons, armed with two 48-ton guns, and plated with 18 inches of armour.

Deficiency
of ships

With the lists of armoured and unarmoured ships built and building, and the statistics of the mercantile marine before us, we cannot rest content with the relative position of our Navy. We have officers, seamen, and reserves. We have unrivalled resources for ship-building. We occupy a truly enviable position in the matter of finance. We have coaling stations in every quarter of the globe, conveniently placed along the great lines of trade. We fall short in ships, and it is a grave question whether we are making a sufficient effort to raise the Navy to a commanding position.

It is not easy to compare the rate of progress of construction. Perhaps the best indication will be found in the relative expenditure on new vessels, hulls and machinery, as given in the Navy Estimates :

		England £	France £
Expenditure on new construction	1888-9	2,669,089	1,848,930
	1887-8	3,058,255	2,510,020
	1886-7	3,463,889	1,280,000
	1885-6	3,544,524	1,355,684
	1884-5	2,242,070	1,510,704
	1883-4	1,580,090	1,536,508
	1882-3	1,767,014	1,559,644
	1881-2	1,682,500	1,400,152
	1880-1	1,420,340	1,345,084
	1879-80	1,388,607	1,375,296
	1878-9	1,508,043	1,504,656
	1877-8	2,922,422	1,501,884
	1876-7	2,121,960	1,301,988
	1875-6	1,613,218	1,054,560

It is necessary to carry the comparison back over a considerable term, for the obvious reason that the power of the Navy can only be built up slowly, by steady and continuous effort. No satisfactory result can be produced by hot fits of expenditure, followed by cold fits of parsimony. As we calmly review the past history of our naval administration, it is evident that for many years the British Navy Estimates were insufficient to maintain a commanding position for our fleet.

For a considerable period our expenditure on naval construction was barely equal to that of France. In the five years 1878-83 it aggregated 7,772,519*l.* as against 7,184,832*l.* In the ten years 1868-78 our expenditure had been 15,881,291*l.* as against 8,349,532*l.* In the six years 1883-89 our votes for shipbuilding show a total of 16,905,828*l.* as against 10,041,846*l.* taken in the French estimates.

French and
English ex-
penditure

In the first decades of the period under review, if the appropriation to shipbuilding was in excess, the application was distinctly less effective under the British than under the French administration. The demands were pressing for the police of the seas, and we clung to the attractive traditions of the days of canvas. In the years 1871-75 our total expenditure on armoured ships was 2,122,986*l.* as against 2,688,461*l.* for the unarmoured vessels. And, while ironclads were comparatively neglected, our unarmoured vessels were useless for the protection of commerce. Our eight ships of the 'Gem' class, 2,120 tons, our nine larger ships of the 'C' class, date from this period. They had an extreme speed of 13 knots at the measured mile, falling in most cases to below 11 knots in blue water. This want of speed is the more to be regretted when we look to the number of cruisers steaming 14 to 16 knots

Inferior
English
cruisers

which the French were building. We have made a marked progress in our naval architecture in recent years, and the programme of the present Admiralty in relation to type is entirely satisfactory.

While the efficiency of the shipbuilding now in hand is not open to doubt, the sufficiency of the Navy Estimates in the present state of European politics has become a topic of serious discussion.

Increase to
the Navy
since 1884

In 1884 public anxiety regarding the Navy gave a new impetus to construction. The result of our increased expenditure is shown in the noble additions which have been made within the last three years to the strength of the fleet. The 'Colossus' and the 'Edinburgh' have been completed. The six fine ships of the 'Admiral' class are complete in all but their armaments. The 'Victoria' and 'Sans Pareil' are well advanced. The seven belted cruisers are all but complete. The unarmoured section of the fleet has been strengthened by four ships of the 'Severn' type, the four ships of the 'Leander' type, the 12 vessels of the 'Archer,' 'Alacrity,' and 'Scout' type, and by numerous gunboats of a class far superior to any preceding design for the British service. Under the same influence which has urged the Admiralty forward from 1885 to 1887, it seems not improbable that another special programme of construction may shortly be proposed. The lists which have been given clearly show that we need a reinforcement in fast ships for the protection of commerce. If we adopt the 'Blake' type, it must be clear that two such ships cannot be sufficient for our requirements. The five ships of the 'Magicienne' type already commenced might with advantage be supplemented by five additional ships.

Mercantile
auxiliaries

It may not be superfluous to observe that the mercantile auxiliaries which, by a wise act of policy, have

recently been secured for the Navy are no match for regularly built vessels of war. They are an answer to other fast vessels of the mercantile marine which have been called into existence and are maintained by lavish subsidies, and which might be armed and sent forth to prey upon our commerce.

Turning from the unarmoured to the armoured ships, the types which should be constructed for the reinforcement of the line-of-battle are a subject of far greater complexity. A majority of naval officers will certainly go for the improved 'Dreadnought' type, represented by the 'Nile' and the 'Trafalgar.' Additional ships of this powerful class would unquestionably strengthen the Navy. If it may be permitted to a layman to offer a suggestion, I would urge that, in addition to these costly vessels, a numerous flotilla—10 at the least—of armoured torpedo rams should be constructed.

Sug-
gestions
for
new con-
struction

The following is a summary of the programme of shipbuilding which has been suggested :

First-class battle-ships ; 10 armoured torpedo rams ; three first-class unarmoured cruisers ; five second-class unarmoured cruisers.

The cost of commencing additional vessels would be met for the current financial year by a supplementary grant. It has been stated that 1,000,000*l.* was voted last year for a like purpose by the French Chambers. The addition to the shipbuilding votes which would be necessary in succeeding years would depend upon the general requirements of the Navy, on the rapidity of construction by contractors, and on other circumstances which cannot now be anticipated.

In conclusion, it remains to consider whether or not it is desirable to make another comprehensive effort in building ships for the Navy, similar to the programme

proposed by Lord Northbrook. The aspect of European politics, so lately dark and threatening, has created an anxiety that the defence of the Empire should be made secure. Recent experience has shown that public opinion in this country will never rest content until our naval superiority has been firmly established. It might be prudent, it would certainly be popular, to propose additional building for the fleet. The subject is under the consideration of the Cabinet, and their decision will be taken with ample knowledge and under a solemn sense of responsibility.

24 Park Lane, May 24, 1888.

XVII

NAVAL EXPENDITURE

SPEECH IN THE HOUSE OF LORDS, JULY 9, 1888

LORD BRASSEY rose to call attention to the foreign squadrons and to the large expenditure on ships not effective for the operations of war or the protection of trade. He disavowed all intention to criticise the present Admiralty, which had rendered excellent service to the country. His object was to propose a change of system, to increase the building of effective ships by diminishing expenditure on those which were comparatively ineffective. The experience of the last two years must have impressed on all who were interested in the Navy the imperative necessity of concentrating our efforts on essentials. Under a Government which could not be suspected of indifference to the security of the Empire we had seen a sweeping reduction of Navy Estimates. He did not condemn the Admiralty for accepting reductions, or the Government for showing some distrust of the assurances so glibly given in various quarters that the country was ready to spend unlimited amounts on the increase of the Navy. The experience of every Chancellor of the Exchequer was the same. Proposals to build ships and to raise seamen were popular enough. There was always some fatal objection to new taxes. Impressed with the difficulty of increasing Estimates, while at the same time desiring to obtain more protection for our commerce, he

would consider the means—in effect the only means—by which the object in view could be attained. It was not necessary to make exaggerated statements as to the inferiority of the British fleet in comparison with other Powers. In the construction of swift and powerful vessels great progress had been made within a recent period. In vessels built or completing we had established a decided superiority. When, however, we turned to the programme of building now in course of erection in France and England, it was evident that our position in the future was seriously threatened.

Cruiser
construc-
tion in
England
and France

Setting aside the torpedo gunboats, which were in no sense cruisers, the English programme of shipbuilding for 1888–89 included the two first-class cruisers, 'Blake' and 'Blenheim,' 9,000 tons, 22 knots; the five second-class cruisers, M type, 2,900 tons, 20 knots; and two third-class cruisers, 1,800 tons, 19·5 knots. The French shipbuilding programme was much more ambitious. It included the 20-knot ships 'Dupuy de Lôme,' belted cruiser, 6,360 tons; and the 'Davoust' and 'Suchet,' protected cruisers, 3,027 tons. Their list of 19-knot vessels included 11 ships—'Tage,' 7,045 tons, 'Cecile,' 5,766 tons, three 'Alger' type, 4,162 tons, and six third-class cruisers, 'Surcouf' type, 1,850 tons. Of ships steaming 19 knots and over, France was building 14, England 9. Making full allowance for greater rapidity of construction, when we looked to the vessels in progress in France and to the figures recently published by Lloyd's, showing the approximate value of our mercantile marine to that of France as 93,000,000*l.* to 9,000,000*l.* we saw that greater efforts were required on the part of the British Admiralty. As an immediate step Sir Arthur Hood recently asked for six additional cruisers. The question to be considered was how such a reinforcement

of the fleet might be obtained with the least charge to the public.

When we were building for the protection of commerce speed was the first condition of efficiency, and we were now, as in the past, wasting money in building too many cruisers greatly inferior in speed to those building in France. We were building four third-class cruisers of the 'Barrosa' class—1,580 tons, 16·5 knots. No figure was named for those ships in the Estimates; but the cost could not be less than 400,000*l*. Then there were the five ships of the 'Buzzard' class, 1,140 tons, 14·5 knots, and the 'Melita,' 12·5 knots, costing, in round figures, 65,000*l*. each. There were also 15 gunboats of the 'Pheasant' type—13 knots; cost 41,000*l*. In all we had in hand 25 comparatively slow vessels, which would cost in the aggregate at least 1,405,000*l*. France had only five vessels of the corresponding class. The cost would be under 400,000*l*. We were spending on cruisers conspicuously inferior to those building for France, Italy, and the United States a sum which would have given us ten more 20-knot cruisers of the 'Medea' class; and it was not open to question that such an addition to the Navy would have been more valuable for the protection of commerce than any number of gunboats. All that unsatisfactory expenditure on peace-service vessels to which he had referred did not fall on the Estimates of the current financial year; but the proportion chargeable to 1888-89 formed a serious deduction from the money available for building effective ships. Excluding indirect charges, 2,667,000*l*. was taken for new construction in 1888-89. An analysis showed that the expenditure on ships designed for war service, including the armoured and protected vessels over 19 knots and the torpedo flotilla, was 1,944,814*l*. Surveying and other necessary services

Inefficient
small ships

absorbed 101,000%. Thus far the appropriation of the shipbuilding vote was entirely satisfactory. What was not satisfactory was that we should spend no less than 621,520% on protected vessels under 17 knots and unprotected vessels under 15 and 14 knots.

Unprofitable expenditure

The excessive construction of vessels of inadequate speed was not a new defect in our naval administration. The extent of this drain on our resources was shown in some striking figures presented to Parliament with the Navy Estimates of this year. Taking the period from 1875-76 onwards, our total expenditure on shipbuilding was 33,134,851%. Looking through the figures in detail, it was painful to see that millions had been sunk in corvettes, sloops, and small vessels designed only for peace requirements, not suitable by reason of insufficiency of speed for the protection of commerce, and not powerful enough for the line of battle. Our larger partially protected ships approached very near in the cost per ton to some of our most powerful ironclads, and in the last ten years we had completed 16 such vessels of the 'Comus' and 'Satellite' types, none having a speed of more than 13 knots. Eleven corvettes of somewhat inferior speed had been built, the earliest having been completed in 1870. Since 1872 we had built 19 sloops, 15 gun-vessels, and 28 cruising gunboats, with speeds ranging from 14 knots in the latest to under 10 knots in the earlier types. The total cost of these vessels was no less than 5,483,733%. The cost of maintenance after completion to March 31, 1887, was given at 1,385,000%; and if they added the dockyard incidental charges apportioned to each ship, amounting to over 1,018,610%, they arrived at a total expenditure in the period subsequent to 1865 amounting to 7,887,522%. It was because we had been building so many vessels adapted only to peace requirements that we

were driven, when the prospect of a conflict with Russia seemed imminent, to take up at great cost for conversion into cruisers merchant steamers absolutely unprotected and weakly armed, but possessing the speed which was indispensable, and in which the ships built for the Navy were wanting. That unhappy experience should not be renewed. They had been more successful in France in checking unprofitable expenditure on what had been happily described as the *poussière navale*. Of 13 to 14 knot vessels, France had 4 and England 26. Of vessels of 13 down to 10 knots France had 43 and England 52. Under 10 knots France had 15 and England 69. Mere harbour-service craft were not included on either side.

It was worthy of notice that our numerical superiority increased as we descended in quality. No Administration would willingly have incurred a large and continuous expenditure on vessels known when they were laid down to be practically useless in war. We had been building, and we were now building, to satisfy demands pertinaciously pressed upon the Admiralty for the display of the flag in every quarter of the globe where we had commercial interests to protect and consuls to represent us, no matter how inferior the vessel upon which it was borne. How seriously our Administration was hampered by these impolitic requisitions was readily seen upon an examination of the squadrons on foreign stations. Taking the numbers as they stood at a recent date, of ships steaming 17 knots and over we had 9 as against 2 French ships. Of the ineffective class steaming 14 knots and under, our ships in commission were 63 to 29 under the French flag. These numbers were exclusive of 11 tenders to our reserve ships and the gunboats attached to our home ports. The excessive number of small vessels under the

Demands
of foreign
stations

British flag on foreign stations originated in the building of gunboats by hundreds in the Crimean war for service in the Baltic. Having these gunboats on our hands, the desire to find a use for them was natural, and at a time when communication was slow and difficult it was desirable to keep vessels near at hand to give protection to British interests. With the introduction of the telegraph and steam the conditions were altered. The policy which we should follow in the altered circumstances of the case was well described in a letter which he had received from Sir Spencer Robinson. Instead of showing our flag in slow and inefficient but costly vessels scattered singly over the globe, squadrons of swift and powerful vessels should be kept ready at home and at certain stations abroad within reach of the electric telegraph, and thence despatched to the place where a naval force might be required. The instruction of the Navy would be best carried on in flying squadrons, in training squadrons, and by an annual mobilisation, such as the present Board of Admiralty had twice carried out to the great advantage of the service.

Consideration of our Naval requirements

He should be glad to learn that the Admiralty had resolved on some revision of the programme of building now before Parliament. It would be satisfactory to receive the announcement that those fast cruisers were about to be ordered which Sir Arthur Hood was so desirous to lay down. As an immediate practical step he would urge that our naval requirements abroad should be specially considered at the Foreign and Colonial Offices. As a result of such an examination he looked for the gradual withdrawal of some 30 or 40 small craft. With Estimates framed in anticipation of peace we must look for the means of strengthening our position not so much to an increase of expenditure as to efficient administration.

XVIII

*MANNING AND SHIPBUILDING IN THE
BRITISH AND THE FRENCH NAVIES*

LETTER TO THE 'TIMES,' AUGUST 28, 1891

THE visit of the French fleet, while it interests us chiefly as an occasion for the exchange of cordial international courtesies, is also an opportunity for comparing our system of manning the Navy and our shipbuilding with those of our powerful neighbour. Where we note differences, we may profitably consider how far the French methods might with advantage be adopted in the British Navy.

And first, as to the system of manning. The crews of our noble squadron now moored with admirable precision at Spithead have been raised under a continuous-service system. Every blue-jacket in the British ships has been trained to the sea from his boyhood at the expense of the State. The training is excellent, but it is costly. The French ships are manned chiefly by hardy fishermen from Boulogne and the coasts of Brittany. Under the rules of the *Inscription Maritime*, every seafaring man in France is liable to serve, and does serve for a short term, in the Navy. Under the French system the State is relieved of the cost of maintaining boys in large numbers in training ships. The seaman enters the service a full-grown man, and the instruction being principally directed to the use of naval weapons,

English
and French
systems of
manning

a fisherman becomes in a comparatively short time an effective man-of-war's man. If the measure of efficiency may be taken from the physical appearance of the crews, or the internal order of the ships, the French system leaves little to be desired. Admitting the impossibility of a compulsory system of manning for the British service, the success of the French Inscription Maritime should impress us with increased confidence in our own naval reserves. We recruit from the same classes as are enrolled in France. It is generally understood that Sir George Tryon has come to the end of his term of service as Admiral Superintendent of the Reserve with a strong conviction of the value of our auxiliary naval forces. It should be a great point of policy in the naval administration of the future to make more of our reserve, to improve the training, and to call upon the men more freely to do service in the Navy. When we mobilise, there should be no hesitation to draw seamen and stokers, lieutenants and engineers, from the Naval Reserve. Hitherto we have been able to man our ships from the permanent force. In view of the completion of the ships now in hand and the extensive construction of the future, we must adopt more largely the French system of manning, or be driven to the alternative of an intolerable burden for pay and pensions.

English
and French
battle-ships

Passing from the men to the ships, I would limit these observations to one important point. Dismissing those vessels in Admiral Gervais's squadron which were designed mainly for coast defence, the battle-ships of the French Navy are represented by the 'Marengo' and 'Marceau.' The former was launched in 1869, the latter in 1887. The interval is long, yet in the later as in the earlier type the French have retained the lofty bow, which has been given up for many years in British

battle-ships. We have gained the advantage of an all-round fire from the forward turret, but it is now generally agreed that our low bows are a mistake. Loss of speed when steaming against even a moderate sea, inferiority in sea-keeping qualities, are acknowledged defects on which the French constructors insist in their criticisms of British designs.

I hold firmly to the opinion that we have gone as far as it is prudent and politic to go in size and cost in our newest second-class battle-ships. The 'Centurion' and 'Barfleur'¹ displace 10,500 tons, and cost 608,000/. This is the type which should be numerous represented in the British Navy, with any improvements which it is practicable to introduce. We may perhaps improve the sea-going qualities of this class by some adaptation from the French models. For the after part of the ship no modification in the leading features, as we find them in the 'Centurion,' would seem to be desirable. Forward, we may probably with advantage give to our ships the lofty bows which seamen admire in the French battle-ships, substituting for the single turret, carrying two guns, as in the 'Centurion,' two turrets, each armed with one heavy gun. The turrets could be built up on either bow in the same position as the pair of turrets in the French 'Amiral Duperré.' It is worthy of note that the French have consistently held that it is not desirable to mount guns in turrets in pairs. The additional weight is a great objection to the larger turret, while any effective blow would probably disable both guns. In the fleet now lying at Spithead every turret in the British ships is armed with two guns; every turret in the French ships is armed with one gun.

Dimensions
and designs
of battle-
ships

In regard to protection by armour, the French ships

¹ These are now included in the first class.—ED.

have no advantage over their British contemporaries. In their ships, as in ours, the protection to buoyancy is limited to a belt at the water-line. The belt extends along the whole length in the French ships. It is shorter but deeper, and of more uniform thickness, in the British ships. In the French ships, as in ours, the guns mounted on the broadside have been wholly unprotected, and the heavy guns mounted in turrets only partially protected. By adding freely to displacement we have in our latest ships given more protection to the secondary armaments. The increase of cost has necessarily reduced the number of ships which can be built for any given sum of money.

Advantage
of numbers

To conclude, a broad and impartial survey of naval construction abroad and at home must impress the conviction that the perfect combination of all desirable qualities is not attainable in a ship of war. In superiority of numbers lies a sure and obvious advantage, to secure which it is politic to accept a limit to dimensions. We may wisely draw the line at the tonnage of our own 'Centurion,' the 'Indiana' and two sister ships, now building in the United States, the 'Sinope' type, of which four are built or building for the Russian Navy, and the four French ships of the 'Marceau' type. Our new second-class battle ships are fractionally larger than the long list which has been given of ships lately built or laid down for foreign navies.

Lorna R.Y.S., Portsmouth Harbour.

XIX

*THE ACTUAL STRENGTH OF THE BRITISH
NAVY, AND THE EXPENDITURE REQUIRED
TO SECURE ITS SUPREMACY*

ADDRESS DELIVERED BEFORE THE LONDON CHAMBER OF
COMMERCE, AT THE MANSION HOUSE, E.C., ON FRIDAY,
FEBRUARY 1, 1889

It is a privilege which I highly value to be permitted to deliver an address on the state of the Navy, under the presidency of the chief magistrate of this great city, and under the auspices of its Chamber of Commerce.

I must open by saying that within the compass of a single paper it is impracticable to deal with the entire administration of the Navy. A choice of topics must be made, and attention will obviously be required to points under discussion, rather than to those, perhaps, of even higher importance on which all men are agreed. It is of vital importance that the personnel of the fleet should be sufficient in numbers and in the highest state of efficiency. On the point of efficiency we have no anxiety. As to numbers, Lord Alcester and other officers have recently given public expression to the views of the highest authorities. Our ships and guns are the great subjects on which doubts have been expressed. I deal to-day with the ships.

In the discussion of this subject, of such vital interest

to the British nation, Sir Thomas Symonds, Sir Geoffrey Hornby, Lord Alcester, Lord Charles Beresford, Captain Fitzgerald, and other able and distinguished naval officers have taken a leading part. To their authority to advise on the naval policy of the country I have no claim. I may, however, be able to assist the elucidation of the naval problem by the contribution of information not easily obtained.

Before deciding as to what should be done for the reinforcement of the Navy, it is essential to take a comprehensive survey—to look back into the past and forward into the future—to look even more to what is being done, or is in contemplation abroad, than to the actual condition of our Navy and its rate of depreciation.

Influence
of the
public

Before and during my period of service at the Admiralty, and more recently as compiler of the 'Naval Annual,' it has been my duty to keep a close and constant watch on what is going on abroad and at home. It will be my endeavour to present the leading facts as they appear to me, in a clear and condensed form. And here it may not be superfluous to point out that the naval advisers of the Admiralty cannot by mere personal and official influence, unsupported by a strong expression of opinion out of doors, obtain the consent of Cabinets to important increases of expenditure. If the public is indifferent, the controlling power of the Treasury—always, and properly, exercised to enforce economy—will make itself felt. The Treasury is not competent in matters naval. In the absence of a demand which must come from without, its rule is, as stated by the Admiralty witnesses before the Committee of the House of Commons on Navy Estimates, to take the expenditure of the preceding year as a basis for the expenditure of the next. The rule, it is obvious, rests on a mere arbitrary

assumption and not on any sure and guiding principle of naval administration. The expenditure necessary for the Navy cannot be a constant quantity or be treated automatically. The measure of our own necessities must be taken by first looking to the strength and the expenditure of other Powers. It is our duty to keep our fleet superior to that of any possible enemy, whether a single Power or two or more Powers combined. As Sir Arthur Hood told the Committee of the House of Commons, if other Powers lay down more ironclads we must lay down vessels faster and more powerful. If they strengthen themselves in cruisers we must maintain our superiority by a proportionate increase of construction.

Having made these general observations, I proceed to give, in a summary form, a comparative view of the strength of the British Navy. (See Tables I. to XI.)

Having due regard to considerations of time, and to the non-professional character of this meeting, I shall not attempt to give a comparison ship by ship. The tables which are in your hands, and for the accuracy of which I am largely indebted to Mr. Barnes, the late Surveyor of Dockyards, supply all the necessary information. I will confine myself to a general analysis, taking the broad facts of collective numbers, tonnage, and date of completion. I shall assume with confidence that, as between one great maritime Power and another, the naval and professional advisers are evenly matched in ability and experience. If this axiom be accepted, it will follow that, as between ships and groups of ships, designed for similar service, and of approximately even date, the relative fighting efficiency will vary as the tonnage.

In the tables, the English fleet is compared with a combination of the ships of France and Russia.

Comparative
strength of
England,
France, and
Russia

194 ACTUAL STRENGTH OF THE BRITISH NAVY

TABLE I.—BATTLE-SHIPS LAUNCHED 1878 to 1888.

ENGLAND				FRANCE				RUSSIA			
Date	Name	Displacement	Speed	Date	Name	Displacement	Speed	Date	Name	Displacement	Speed
		Tons	Knots			Tons	Knots			Tons	Knots
1888	Nile . . .	11,940	16.5	1887	Neptune . .	10,581	15.0	1888	Nicholas I.	8,000	16.0
1887	Trafalgar . .	11,940	16.5	1887	Marceau . .	10,581	15.0	1887	Alexander II.	8,440	15.0
1887	Victoria . .	10,470	16.7	1886	Hoche . . .	10,581	15.0	1887	Tchesmé . .	10,800	15.0
1887	Sans Pareil .	10,470	16.7	1885	Formidable .	11,380	15.0	1887	Sinope . . .	10,800	15.0
1886	Anson . . .	10,600	16.7	1885	Caiman . .	7,200	14.5	1886	Ekaterina II.	10,800	15.0
1885	Camperdown	10,600	16.7	1885	Requin . . .	7,200	14.5				
1885	Howe . . .	10,300	16.7	1883	Amiral Baudin . .	11,380	15.0				
1885	Hero . . .	6,200	15.5		Indomptable	7,200	14.5				
1885	Benbow . .	10,600	16.7	1883	Terrible . .	7,200	14.5				
1884	Rodney . .	10,300	16.7	1881	Courbet . .	9,700	15.0				
1882	Collingwood	9,500	16.4	1881	Dévastation .	10,100	15.1				
1882	Colossus . .	9,420	15.4	1879	Amiral Duperré . .	11,100	14.2				
1882	Edinburgh .	9,420	15.4								
1881	Conqueror .	6,200	15.5								
1880	Ajax . . .	8,660	13.0								
1879	Agamemnon	8,660	13.0								
	Total 16 ships	155,280			Total 12 ships	114,203			Total 5 ships	48,840	

ACTUAL STRENGTH OF THE BRITISH NAVY 195

TABLE II.—BATTLE-SHIPS LAUNCHED BEFORE 1878, AND RECKONED EFFECTIVE.

ENGLAND				FRANCE				RUSSIA			
Date of Launch	Name	Displacement	Speed	Date of Launch	Name	Displacement	Speed	Date of Launch	Name	Displacement	Speed
1876	Inflexible	Tons 11,880	Knots 13.8	1877	Triomphante	Tons 4,700	Knots 12.9	1872	Peter the Great	Tons 9,340	Knots 14.0
1876	Téméraire	8,540	14.6	1876	Redoutable	9,200	14.6		Kniaz	4,500	10.5
1875	Dreadnought	10,820	14.2	1876	Trident	8,800	14.1	1867	sky		
1875	Superb	9,170	13.2	1875	Colbert	8,400	14.4				
1875	Alexandra	9,490	15.0	1875	Victorieuse	4,600	12.7				
1874	Neptune	9,310	14.2	1873	Friedland	8,300	13.3				
1872	Thunderer	9,330	13.4	1873	Richelieu	9,100	13.1				
1871	Devastation	9,330	13.8	1872	La Galissonnière	4,700	13.1				
1870	Sultan	9,290	13.5(a)		Suffren	7,600	14.3				
1870	Swiftsure	6,910	13.7	1870	Marengo	7,900	13.5				
1870	Triumph	6,640	13.5	1869	Océan	7,500	13.7				
1870	Iron Duke	6,010	12.5(a)	1868	Héroïne	5,887	13.0				
1869	Audacious	6,010	13.2(a)	1863							
1869	Invincible	6,010	13.8(a)								
1868	Monarch	8,320	14.9								
1868	Hercules	8,680	13.6(a)								
1865	Bellerophon	7,550	14.2								
	Total 17 ships	143,210			Total 12 ships	86,687			Total 2 ships	13,840	

N.B.—The hulls of all the battle-ships launched for the British Navy in the period 1868-77 are of iron. With the exception of the 'Redoutable' and 'Friedland' all the French ships are of wood.
(a) Deduced.

TABLE III.—BATTLE-SHIPS ORDERED AND LAID DOWN TO BUILD.

ENGLAND.—NIL.							
FRANCE				RUSSIA BALTIC FLEET			
Type	Name	Displacement	Speed	Type	Name	Displacement	Speed
		Tons	Knots	—	N.	9,800	—
—	Brennus .	10,826	18.0	—	N. BLACK SEA FLEET	6,600	—
Marceau .	Magenta .	10,600	15.0	—	N.	8,100	—
				—	N.	8,100	—

Not Effective unless Repaired.

TABLE IV.—BATTLE-SHIPS.

Sans Valeur Sérieuse.

FRANCE					ENGLAND				
Date of Launch	Material of Hull	Name	Speed Knots	Displacement Tons	Date of Launch	Material of Hull	Name	Speed Knots	Displacement Tons
1868	W	Repulse .	12.3	6,190	1872	W	Bouledogue	12.2	3,505
1865	W	Lord Warden .	—	7,840	1871	W	Tigre .	12.1	3,500
1863	I	Valiant .	—	6,710	1870	W	Bélér .	12.3	3,600
1862	—	Hector	12.4	6,710	1863	W	Montcalm .	11.7	3,840
1861	—	Defence .	—	6,270	1867	W	Thétis .	12.0	3,621
		Total 5 ships .		33,720	1865	W	Taureau .	12.5	2,700
					1865	—	Revanche .	13.2	5,819
					1864	—	Savoie .	13.4	5,819
					1863	I	Onondaga .	7.0	2,590
							Total 9 ships .		34,989

1861	—	Defence . . .	—	6,270	1863	—	34,989
		Total 5 ships . .		33,720		Total 9 ships . .	

ACTUAL STRENGTH OF THE BRITISH NAVY 197

TABLE V.—COAST DEFENCE, COMPARISON OF SHIPS COMPLETED AND COMPLETING AFTER LAUNCHING.

ENGLAND				FRANCE			RUSSIA		
Date of Launch	Name	Displacement		Date of Launch	Name	Displacement	Date of Launch	Name	Displacement
1879	Orion	Tons 4,870		Building	Phlegeton	Tons 1,640	1868	Admiral Spiridoff }	Tons 3,740
1876	Belleisle	4,870		"	Styx . . .	1,640	1868	Admiral Greig }	3,593
1872	Rupert	5,440		1887	Grenade . .	1,050	1868	Admiral Tchitchagoff }	3,511
1871	Cyclops	3,480		1886	Cocyte . . .	1,639	1867	Admiral Lazareff }	3,536
1871	Hecate	3,480		1885	Mitraille . .	1,045	1865	Kreml . . .	3,412
1871	Hydra	3,480		1885	Achéron . .	1,639	1864	Netron Menya . .	3,370
1870	Gorgon	3,480		1884	Flamme . . .	1,045	1863	Pervenets . . .	3,279
	Hotspur	4,010		1883	Fusée . . .	5,700			
				1880	Furieux . . .	4,707			
				1878	Tonnant . .	4,523			
				1877	Vengeur . .	5,600			
				1876	Fulminant .	4,523			
				1875	Tempête . .	5,700			
					Tonnerre . .				
	Total 8 ships .	33,110			Total 14 ships .	41,496		Total 7 ships .	24,441

SUMMARY—France and Russia, 21 ships, 65,937 tons displacement. England, 8 ships, 33,110 tons displacement.

TABLE VI.—HARBOUR DEFENCE.
COMPARISON OF SHIPS COMPLETED.

ENGLAND				RUSSIA			
Date of Launch	Name	Speed	Displacement	Date of Launch	Name	Speed	Displacement
1871	Glatton	Knots 12.1	Tons 4,910	1875	Admiral Popoff	Knots 7.0	Tons 3,550
1870	Magdala	10.4 (a)	3,340	1873	Novgorod	7.0	2,500
1870	Abyssinia	9.6 (a)	2,900	1867	Tcharodeika	8.5	2,026
1870	Cerberus	9.75	3,480	1867	Rusalka	8.5	1,960
1867	Penelope	12.7	4,470	1864	Vestchun	7.0	1,565
1865	Viper	9.6	1,230	1864	Uragan	7.0	1,565
1865	Vixen	8.9	1,230	1864	Tifon	7.0	1,565
1864	Prince Albert	11.3	3,880	1864	Strelets	7.0	1,565
1863	Scorpion	10.5	2,750	1864	Perun	7.0	1,565
1863	Wivern	10.1	2,750	1864	Lava	7.0	1,565
				1864	Latnik	7.0	1,565
				1864	Koldun	7.0	1,565
				1864	Edinorog	7.0	1,565
				1864	Bronenosets	7.0	1,565
				1864	Smertch	8.2	1,530
	Total 10 ships	.	30,940		Total 15 ships	.	27,216

(a) Deduced.

ACTUAL STRENGTH OF THE BRITISH NAVY 199

TABLE VII.—ARMoured CRUISERS.

N.B.—The lists for France and Russia are taken from the return moved for by Lord Charles Beresford. To the British ships included in the list, the ironclads of the period 1860-66 have been added. With triple-expansion engines they are capable of steaming 16 knots, with good coal endurance.

ENGLAND				FRANCE				RUSSIA			
Date of Launch	Name	Displacement	Speed	Date of Launch	Name	Displacement	Speed	Date of Launch	Name	Displacement	Speed
		Tons	Knots			Tons	Knots			Tons	Knots
1887	Galatea	5,600	18.5	1883	Duguesclin	5,900	14.0	1884	Admiral { Nakhimoff }	7,780	16.0
1887	Aurora	5,600	18.5	1882	Vauban	5,900	14.0				
1887	Immortalité	5,600	18.5	1880	Bayard	6,000	14.5	1883	Vladimir { Monomakh }	5,796	15.4
1886	Orlando	5,600	18.5	1879	Turenne	6,400	14.1				
1886	Australia	5,600	18.5					1882	Dimitri { Donskoi }	5,796	16.2
1886	Narcissus	5,600	18.5	B'd'g.	{ Dupuy de }	6,300	20.0	1878	Minin	5,740	12.9
1886	Undaunted	5,600	18.5	"	Lône	6,300	20.0	1875	Duke of Edinburgh }	4,600	13.0
1884	Warspite	8,400	16.7		N. { N. (reported) }						
1884	Impérieuse	8,400	16.7		additional			1873	General { Admiral }	4,600	13.0
1886	Nelson	7,630	14.0		to programme in	6,300		B'd'g.	Panyat { Azova }	6,000	17.5
1886	Northampton	7,630	13.2		Estimates { for 1889 }						
1885	Shannon	5,390	12.3								
1886	Northumbria	10,780	14.1								
1885	Agincourt	10,690	14.8								
1883	Minotaur	10,690	14.4								
1883	Achilles	9,820	14.3								
1881	Black Prince	9,210	13.6								
1880	Warrior	9,210	14.1								
	18 ships	137,050	tons		7 ships	43,100	tons		7 ships	40,312	tons

N.B.—The material of hull for all the British and Russian ships, and for the 'Vauban' and 'Duguesclin,' is iron and steel.

The 'Turenne' and 'Bayard' are wood-built.

TABLE VIII.—CRUISERS.—UNARMED.—COMPLETED AND COMPLETING.

N.B.—All the cruisers of 16 knots and over are built of steel or iron. For the inferior speeds the material of hull is given in a separate column. S=steel; C=composite; W=wood.

ENGLAND					FRANCE				RUSSIA					
	Date	Name	Dis- place- ment	Speed		Date	Name	Dis- place- ment	Speed		Date	Name	Dis- place- ment	Speed
			Tons	Knots				Tons	Knots				Tons	Knots
20 knots and over	1888	Medusa .	2,800	20		1888	Cecile . .	5,766	19-0		1887	Admiral Korniloff	5,029	18
	1888	Medea . .	2,800	20		1888	Tronde . .	1,847	19-5					
		2 ships .	5,600			1888	Lalande . .	1,847	19-5					
19-20 knots	1888	Mara'hon .	2,950	19½		1888	Cosmao . .	1,847	19-5					
	1888	Magicienne	2,950	19½		1888	Coetlogon .	1,818	19-5					
	1888	Melpomene	2,950	19½		1888	Forbin . .	1,850	19-5					
						1886	Tage . . .	7,045	19-0					
		3 ships .	8,950				7 ships .	22,020				1 ship	5,029	
18-19 knots	1878	Mercury . .	3,730	18-0		1884	Milan . .	1,540	18-0					
	1877	Iris . . .	3,730	18-0										
		2 ships .	7,460											
17-18 knots	1887	Serpent . .	1,770	17-5 to 18-0		1887	Faucon . .	1,280	17-0 to 18-0					
	1887	Racon . .	1,770	17-5 to 18-0		1886	Epervier . .	1,280	17-0 to 18-0					
	1886	Brak . . .	1,770	17-0		1885	Condor . .	1,280	17-0 to 18-0					
	1886	Mohawk .	1,770	17-0										
	1886	Porpoise .	1,770	17-0										
	1886	Cossack .	1,770	17-0										
	1886	Tartar . .	1,770	17-0										

1886	Briak . .	1,770	17-0	1885	Condor . .	1,280	17-0 to 18-0
1886	Mohawk .	1,770	17-0				
1886	Porpoise .	1,770	17-0				
1886	Cossack .	1,770	17-0				
1886	Tartar .	1,770	17-0				

1886	Fearless .	1,580	17-0				
1886	Forth . .	4,050	17-0				
1885	Thames .	4,050	17-0				
1885	Mersey .	4,050	17-0				
1885	Severn .	4,050	17-0				
1885	Alacrity .	1,700	17-0				
1885	Scout . .	1,580	17-0				
1885	Archer .	1,770	17-0				
	15 ships .	35,920			3 ships .	3,840	

1885	Surprise .	1,650	16-8	1884	Sfax . . .	4,468	16-0	S
1883	Phaeton .	4,300	16-5	1876	Duquesne .	5,800	16-9	C
1883	Amphion .	4,300	16-5	1876	Tourville .	5,600	16-9	C
1882	Leander .	4,300	16-5					
1882	Arethusa .	4,300	16-5					
1873	Shah . . .	6,250	16-2					
1868	Inconstant .	5,780	16-2					
	7 ships .	30,860			3 ships .	15,388		

1876	Bacchante .	4,130	15-1	1867	Duguay Trouin .	3,300	15-9	C
1873	Raleigh .	5,200	15-3	1880	Nielly .	2,300	15-0	C
1869	Volage . .	3,080	15-1	1879	D'Estaing .	2,400	15-3	C
1869	Active . .	3,080	15-1	1874	Dupetit Thouars .	2,000	15-0	W
				1874	Seignelay .	1,900	15-0	W
				1869	Hirondelle .	1,869	15-5	
	4 ships .	15,490			6 ships .	13,769		

15-16 knots				1885	Rynda . .				Tons 2,950	Knots 15-0
				1884	Vitiaz . .				2,950	15-0

TABLE VIII.—(continued).
CRUISERS—UNARMoured (continued).

ENGLAND						FRANCE						RUSSIA					
Date	Name	Dis- place- ment	Speed	Mate- rial of Hull		Date	Name	Dis- place- ment	Speed	Mate- rial of hull		Date	Name	Dis- place- ment	Speed	Mate- rial of Hull	
			Tons						Knots						Tons		Knots
14-15 knots	Daphne . .	1,140	15.0	S		1884	Dubourdieu	3,400	14.0	W		1860	Pamyat	3,050	14.0		
	1888	Nymphe . .	1,140	15.0	S		1882	Aréthuse . .	3,400	15.0	W			Merkuriya		14.0	
	1887	* Buzzard .	1,140	15.0	S		1882	Roland . .	2,300	14.0	C		1878	Zabiyaka .	1,234	14.0	
	1877	Euryalus .	4,140	14.7	C		1882	Primaugnet	2,400	15.0	C						
	1875	Boadicea .	4,140	14.7	C		1881	Iphigénie .	3,200	14.0	W						
	1874	Rover . .	3,460	14.5	C		1881	Magon . .	2,300	14.0	C						
						1881	Naiade . .	3,500	14.0	C							
						1879	Forfait . .	2,400	14.0	C							
						1879	Willars . .	2,400	14.0	C							
						1876	Laperouse .	2,400	14.0	C							
						1876	Rigault-de- Genouilly	1,710	14.3	C							
						1872	Champlain .	2,000	14.0	W							
						1870	Sané . .	1,900	15.0	W							
						1868	Château- renault .	1,850	14.2	W							
						1868	Eclairneur .	1,830	15.0	W							
						1866	Desaix . .	1,683	14.2	W							
	6 ships .	15,160					16 ships .	98,673					2 ships .	4,234			
13-14 knots	Calypso . .	2,770		Cost £		1872	La Cloche- terie . .	2,100									
	1884	Pylades . .	1,420	82,071		1872	Duchaffault	1,340									
	1883	Callicope .	2,770	157,930		1872	Kerguelen	1,340									

ACTUAL STRENGTH OF THE BRITISH NAVY 203

	1869	Infonet.	1866	18-9
1883 Rapid . . .	73,644			
1883 Royalist . .	1,420			
1883 Caroline . .	78,357			
1881 Cordelia . .	81,002			
1881 Canada . . .	130,875			
1881 Cordia . . .	2,380			
1881 Satellite . .	131,565			
1881 Heronine . .	68,056			
1881 Hyacinth . .	73,297			
1880 Constance .	73,210			
1878 Cleopatra . .	123,015			
1878 Curaçoa . .	122,681			
1878 Conquest . .	121,596			
1878 Champion . .	123,044			
1877 Garnet . . .	122,908			
1876 Emerald . .	102,288			
1875 Opal . . .	107,424			
1874 Sapphire . .	102,824			
	86,899			
	4 ships			
	6,716			
1878 Comus . . .	2,380	Tons		
1878 Caryfort . .	2,380	Fabert . .	2,100	
1876 Turquoise . .	2,120	Beautemps-	1,850	
1876 Ruby . . .	2,120	Beaupré		
1875 Tourmaline .	2,120			
1874 Diamond . .	1,970			
	6 ships			
	13,090			
	644,058			
	2 ships			
	3,450			
12-13 knots				
	1881	Opritchnik .		Tons
	1880	Vestnik . .		1,385
	1880	Streflok . .		1,385
	1879	Plastun . .		1,385
	1877	Razboznik .		1,385
	1878	Nayezdnik .		1,385
	1879	Africa . . .		2,862
	1876	Djigit . . .		1,385
	1875	Kreiser . . .		1,385
	1874	Asia . . .		2,488
				10 ships .
				16,015

* Buzzard class has been added to the list of cruisers.

TABLE IX.—UNARMoured CRUISERS. ON THE STOCKS.

ENGLAND			FRANCE		RUSSIA	
Speed	Name	Displacement	Name	Displacement	Name	Displacement
22 knots	Klake	9,000				
	Blenheim	9,000				
20 knots	Vulcan	6,620				
	(Torpedodepôt ship)					
19.5 knots	Barham	1,830				
	Bellona	1,830				
19 knots	* Pandora	2,575	Isly	4,160		
	* Pelorus	2,575	Jean Bart	4,160		
	* Persian	2,575	Alger	4,160		
	* Phoenix	2,575	Davoust	2,977		
	* Psyche	2,575	Suchet	2,977		
			Surcouf	1,850		
18 knots			Vautour	1,280	N	4,300
			Wattignies	1,280		
16.5 knots	Blanche	1,580				
	Blonde	1,580				
	Barracouta	1,580				
	Barrosa	1,580				
	Total 14 ships	47,475 tons	Total 8 ships	22,844 tons	Total 1 ship	4,300 tons

* Australasian squadron.

TABLE X.—TORPEDO VESSELS. COMPLETED, COMPLETING, AND BUILDING.

ENGLAND				FRANCE AND RUSSIA			
Date of Launch	Name	Speed	Displacement	Date of Launch	Name	Flag	Speed
Building	Spanker	Knots 21.0 (b)	Tons 735	Building	Kapitan Saken	R	Knots 20.0
"	Speedwell	21.0 (b)	735	1886	Ilyin	R	20.0
"	* Whiting	21.0 (b)	735	1886	Lance	F	19.5
"	* Wizard	21.0 (b)	735	1886	Salve	F	19.5
1888	Sharpshooter	21.0 (b)	735	1886	Bombe	F	19.5
1888	Salamander	21.0 (b)	735	1885	Coldeuvrine	F	19.5
1888	Seagull	21.0 (b)	735	1885	Dague	F	19.5
1888	Sheldrake	21.0 (b)	735	1885	Dragonne	F	19.5
1887	Skipjack	21.0 (b)	735	1885	Flèche	F	19.5
1887	Grasshopper	19.0 (b)	525	1885	Saint-Barbe	F	19.5
1887	Sandfly	19.0 (b)	525	1877	Vzryv	R	17.0
1887	Spider	19.0 (b)	525				
1886	Rattlesnake	18.5 (b)	550				
1881	Polypheumus	17.8	2,640				
1874	Vesuvius	9.7	245				
	Total 15 ships		11,620		Total 11 ships		
							3,894

* Australasian service.

(b) Estimated.

TABLE XI.—TORPEDO BOATS.

	ENGLAND			FRANCE			RUSSIA				
	No.	Date of Launch	Speed	No.	Date of Launch	Displacement	Speed	No.	Date of Launch	Displacement	Speed
FIRST CLASS	2	1886 to 1887	Knots 20.3 to 23.0	10	1886 to 1887	Tons 65 to 148	Knots 20 to 22.0	3	1886	Tons 100 to 120	Knots 19.5 to 20.0
	6	1882 to 1887	19.4 to 22.4	3	1887 to 1888	98 to 117	20 to 24.0	19	1880 to 1886	40 to 90	17 to 20.0
	59	1882 to 1887	18.4 to 22.4	53	1887 to 1888	43 to 54	19 to 21.0	2	1887		
	19	1877 to 1880	15.5 to 21.9	17		54	19.5				
SECOND CLASS				41	1876 to 1881	26 to 35	17 to 20.0				
	51	1878 to 1888	11.9 to 17.3	7	1876 to 1882	11 to 15	14 to 16.0	70	1878	24	17.0
	10										
60 to 80 feet	12	1883 to 1888	14.4 to 16.3								
Torpedo boats, wood.											
Completing											

TOTALS.—COMPLETED AND BUILDING.

	ENGLAND		FRANCE AND RUSSIA	
	No.	Date of Launch	No.	Date of Launch
FIRST CLASS. Above 130 feet	8		16	
100 to 130 "	59		91	
80 to 100 "	19		41	
SECOND CLASS. 60 to 80 "	61		77	
Torpedo boats, wood	12			

To begin with the battle-ships. Of this class, launched in 1879 and subsequently, the British Navy has 16 ships, with a collective displacement of 155,280 tons. The combined fleets of France and Russia muster 17 armoured battle-ships, launched in the same period, and having a collective displacement of 163,043 tons.

Battle-ships

Of battle-ships of an earlier date, launched before 1878 and still reckoned effective, England has 17, with a collective displacement of 143,210 tons; France has 12 ships of 86,687 tons; Russia has two ships of 13,840 tons.

On the list of battle-ships not effective unless repaired, we have five ships, of 33,720 tons; the French nine ships, of 34,989 tons. Our 'Valiant,' 'Hector,' and 'Defence' are worth repair for harbour defence in the ports of the Antipodes. I would specially instance the protection of such a port as Adelaide.

From this comparison it is clear that in battle-ships we are not a match for such a combination as we are bound to keep in view.

Turning from the list of ships built to the list of those ordered or on the stocks, we find that in France two battle-ships—the 'Brennus,' 10,826 tons, and the 'Magenta,' 10,600 tons, have recently been laid down. In an article on the naval construction in progress, published in the 'Times' in December, it is stated that Russia is building two ironclads of 8,000 tons each, on the Black Sea, and two on the Baltic, of 9,800 and 6,600 tons respectively. It is perhaps to be regretted that we have hesitated to lay down battle-ships at a time when considerable activity is being displayed elsewhere.

To complete the list of ironclads, it will be necessary to refer to vessels for coast and harbour defence, classes of relatively small importance to a Power which is resolved to maintain the command of the seas. For

Coast-defence ironclads

coast defence, we have the 'Orion' and 'Belleisle,' 'Rupert,' 'Hotspur,' and four others, of the 'Gorgon' type—all launched within the period 1870-79. Their collective displacement is 33,110 tons. The French are decidedly stronger in this class. They have 14 vessels, measuring 41,496 tons, the oldest launched in 1875. The seven latest vessels included in the French Coast-Defence list are armoured gunboats, designed as an answer to the armoured gunboats laid down for Germany. French naval critics do not speak favourably of the gunboats.

In the list of coast-defence vessels, the French have the powerful ships 'Fulminant' and 'Furieux,' of 5,700 tons. We have no similar vessels.

The Russian list of coast-defence vessels contains seven ships, all of the earliest period of armoured construction, and measuring in the aggregate 24,441 tons. We are never likely to see these Russian vessels out of the Baltic.

Our harbour-defence ironclads are ten in number, of 30,940 tons. All are efficient for harbour defence. The 'Penelope,' although a sea-going ship, has been added to the list, having been despatched to the Cape for the defence of Simon's Bay.

France has no mere harbour defence-vessels. The Russians have 15 such ships, of 27,216 tons.

Cruisers

Following the order adopted in preparing the return laid before Parliament on the motion of Lord Charles Beresford, we pass on to the cruisers. Speaking before the representatives of the shipowners of this great maritime country, it would be a waste of words to insist on the importance of strength and efficiency in this section of the fleet.

Armoured

Taking first the armoured cruisers, the lists for France

and Russia are made up from Lord Charles Beresford's return. To the British ships included in that return, the ironclads of the period 1860-66 have been added. The 'Northumberland,' 'Agincourt,' 'Minotaur,' 'Achilles,' 'Black Prince,' and 'Warrior,' are in good condition as to their hulls. The method of protection can scarcely be condemned as obsolete. Quick-firing guns and highly explosive shells have brought us back to the comparatively thin armour, spread over a wide area of side, which was used during the first period of armoured construction. The French are building ships which, in respect to the system of protection, are almost identical with those we have the good fortune to possess ready to our hand, and which can quickly be brought up to modern requirements. I have consulted Sir Edward Reed as to the capabilities of these ships, and I have his authority for saying that with improved engines they could attain a speed of 17 to 18 knots. The ships under consideration have been criticised for their excessive length. It is well to remember that length is a valuable feature in the maintenance of speed when contending with the long rollers which sweep the Southern Ocean. If we were engaged in a serious conflict, an effort would be made to intercept the trade along the great ocean routes between England and her colonies. For the protection of this trade the 'Northumberland' and the long ships of the same type would be eminently suitable.

Adding the early ironclads to the list of armoured cruisers, as given to Parliament, we have for England, completed and completing after launching, eighteen ships, of 137,050 tons. France has four ships, 24,200 tons, and Russia seven ships, 40,312 tons. Two armoured cruisers of the 'Dupuy de Lôme' type, of 6,300 tons, and a speed of 20 knots, are on the stocks for the French Navy. It

'Warrior'
and 'Minotaur'
class
of cruisers

has been reported that another vessel of the same type will be added to the French programme, as presented in the Navy Estimates. No vessels of the same class are in progress for the British Navy. The laying down of armoured cruisers, commencing with the 'Warspite' and 'Impérieuse,' and followed up with the five ships of the 'Orlando' class, to which Lord George Hamilton added two, was a marked feature of our shipbuilding under the Administration of Lord Northbrook.

Un-
armoured

We now come to the unarmoured cruisers. They will be most conveniently classified with reference to speed. As a rule, the fastest ships are the latest, and the slowest are the oldest. Our position will be most concisely stated in a tabular form.

UNARMOURD CRUISERS COMPLETED AND COMPLETING.

ENGLAND			FRANCE		RUSSIA	
Speed	Ships	Tons	Ships	Tons	Ships	Tons
20 knots and over	2	5,600	—	—	—	—
19-20 knots . . .	3	8,850	7	22,020	1	5,029
18-19 " . . .	2	7,460	1	1,540	—	—
17-18 " . . .	15	35,220	3	3,840	—	—
16-17 " . . .	7	30,880	3	15,888	—	—
15-16 " . . .	4	15,490	6	13,769	2	5,900
14-15 " . . .	6	15,160	16	38,673	2	4,284
13-14 " . . .	20	40,470	4	6,716	—	—
12-13 " . . .	6	13,090	2	3,450	10	16,015

The French take a decided lead in vessels capable of steaming 19 knots and upwards. Descending to the slower speeds our superiority becomes conspicuous. In 16- to 18-knot ships we have twenty-two of 66,100 tons, as against six French ships of 19,728 tons. In the class of 15- to 16-knot vessels the two Powers are approximately equal. In 14- to 15-knot vessels the French have more than double our strength, and our great superiority in

numbers and tonnage in the class of 12- to 14-knot vessels gives us no compensation. We have numerous and costly unarmoured cruisers of modern date, with speeds under 14 knots on the measured mile, and under 12 in blue water. No less than 26 vessels of this class were launched in the ten years 1874-84, of which the aggregate cost was 2,792,291*l*.

Such an expenditure is the more to be regretted in view of the fact that the sixteen 14- to 15-knot ships in the French list of cruisers were for the most part contemporary with British vessels of two knots less speed.

Unprofit-
able con-
struction

In criticising the construction of the past with the cheap wisdom which is derived from experience, no blame is cast upon individuals. The 'C' and the 'Gem' classes of cruisers represent the ideas in vogue in the Navy some fifteen years ago. We clung to canvas, and accepted models built rather for good sailing than great speed under steam. The vessels which I have criticised as of little service in war are excellent for police of the seas.

We now turn to our list of unarmoured cruisers on the stocks. If we put aside the 'Vulcan' and the five light cruisers of the Australasian contingent, we have our 'Blake' and 'Blenheim,' of 9,000 tons and 22 knots, to match three French ships, 'Alger' type, 4,160 tons and 19 knots. We have the 'Barham' and 'Bellona,' 1,830 tons, 19.5 knots, to match the 'Davoust' and 'Suchet,' 2,977 tons, and the 'Surcouf,' 1,850 tons, all three having a speed of 19 knots. Under 19 knots we have four 'Blonde' class, 1,580 tons, 16.5 knots. France has two torpedo cruisers of the 'Vautour' type, 1,280 tons, 18 knots. We are building many gun-vessels. The French are building none.

Building

The torpedo flotilla will complete the enumeration of

Torpedo
flotilla

the fighting ships of the three Powers under review. Omitting the 'Vesuvius,' the 'Polyphemus,' the pioneer of our torpedo vessels, was a bold experiment. Torpedo rams with more armour and of less complex construction should be added in numbers to the fleet. Latterly great efforts have been made, and wisely so, to strengthen our Navy in torpedo vessels capable of keeping the sea. Built and building, we have 11 vessels of the 'Sharpshooter' and 'Rattlesnake' types.

Mere torpedo boats are the arm of the feeble. They are valuable only for defence, and need not occupy us to-day. The march of improvement is rapid, and torpedo boats can be built quickly. We should build up to our need for purely local defence.

We may now give the general results of our comparison of ships built and building.

Summary

Battle-ships.—In ships of the last decade we are inferior to the combined strength of France and Russia. In ships launched before 1878 we have a decided advantage. Our non-effective ships are more capable of repair than those of the French. On the stocks we are doing nothing. France and Russia are at work.

In coast-defence vessels we are much behind.

In harbour defence we have equality.

In armoured cruisers we have an advantage, and can make our present superiority yet more decided if we take in hand, as we ought to do, the fine ships which our predecessors had the wisdom to build of iron, while our neighbours were constructing in wood.

In that most important class, the sea-keeping torpedo vessels, we have made a good beginning. In unarmoured cruisers we are deficient in ships of commanding power and speed.

Having given a comparison of the ships, it will be

interesting to trace the shipbuilding policy of the past, as it is expressed in the Navy Estimates. And here it is perhaps necessary to remark that it is in vain to expect an important increase in our rate of construction without addition to expenditure. Diligent and able critics, both in and out of Parliament, have accomplished much in the improvement of administration. I do honour to the present Government for all that they have achieved; but as an old official it is my duty to express the conviction that neither the dockyards nor the Admiralty are quite so black as they are painted. The utmost that can be accomplished in the direction of economy only amounts to a small percentage on the cost of building.

Past ship-
building
policy

Proceeding to review the expenditure on shipbuilding, the fluctuations at successive periods are shown in Table XII. (p. 214), of which the following is a summary.

EXPENDITURE ON CONSTRUCTION OF NEW VESSELS.

(Hulls and Machinery.)

	England	France
1863-78 = 15 years . . .	£22,769,928	£12,746,948
1878-83 = 5 „ . . .	7,184,832	7,772,519
1883-89 = 6 „ . . .	19,929,797	11,801,480
	£49,884,557	£32,320,947

Before the Franco-German war, our expenditure on construction had been nearly double that of the French. In the ten years 1868-78, the French Navy estimates were cut down, under the financial pressure consequent on the payment of the war indemnity to Germany. In 1878, a sudden change took place in the relative scale of naval expenditure. Peace being for the time assured by the Treaty of Berlin, and a considerable reinforcement having been added to the Navy by the purchase of ironclads during the Russo-Turkish war, considerations

French and
English ex-
penditure
on con-
struction

TABLE XII.—COMPARATIVE STATEMENT SHOWING EXPENDITURE ON CONSTRUCTION OF NEW VESSELS, HULLS AND MACHINERY, IN ENGLAND AND FRANCE, FROM 1863-64 TO 1887-88.

Year	England	France	Year	England	France	Year	England	France
1863-64	£ 1,282,710	£ 920,196	1872-73	£ 809,087	£ 614,460	1881-82	£ 1,682,500	£ 1,400,152
1864-65	1,674,574	873,300	1873-74	1,290,028	789,684	1882-83	1,767,014	1,559,644
1865-66	1,116,198	931,348	1874-75	1,528,161	921,380	1883-84	1,930,090	1,536,508
1866-67	1,014,406	875,468	1875-76	1,613,218	1,054,560	1884-85	2,242,070	1,510,704
1867-68	1,800,749	797,104	1876-77	2,121,960	1,301,988	1885-86	3,737,000	1,355,684
1868-69	1,694,362	668,780	1877-78	2,922,442	1,501,884	1886-87	3,495,000	1,280,000
1869-70	1,387,047	655,016	1878-79	1,508,049	1,504,656	1887-88	3,058,000	2,510,020
1870-71	1,330,814	411,948	1879-80	1,388,607	1,375,296	1888	3,061,000	1,848,930
1871-72	1,184,172	429,832	1880-81	1,426,349	1,345,084	1889	—	1,759,684

of economy were held paramount, and our rate of progress in construction was brought down to a bare equality with that of the French. Speaking in the House of Commons, in reply to Lord Charles Beresford, Lord George Hamilton said that the average expenditure on new construction for the six years ending 1884-85 was 1,650,000*l.*, while in France, for the same period, the average was 1,450,000*l.*—a difference of only 200,000*l.* In his opinion that was a dangerous approximation.

In 1880-81 we began slowly to draw ahead. Later, aroused by the vigilance of the Press, the country became anxious as to the state of the Navy. More vigorous efforts were insisted upon, and a large programme of additional shipbuilding was laid before Parliament by Lord Northbrook. Our expenditure on construction in the present year is nearly as 3 to 2 when compared with the French. It ought to be as 4 to 2.

The comparison of ships has shown that we have leeway to make good, both in battle-ships and in fast cruisers. While it is necessary to ask for additional money, it will conduce materially to economy if we build fewer small and slow vessels and concentrate our efforts on the finest and fastest vessels the constructors of the period can produce. The Estimates, in their improved form, give a return showing the first cost of construction of all the ships—effective and non-effective—on the strength of the Navy, under their years of completion (Table XIII.). In the twenty years 1867-88 (Table XIII.) the cost of the armoured ships was 22,195,485*l.*; the protected, 753,718*l.*; the partially protected, steaming over 14 knots, 825,289*l.*; and the torpedo cruisers and torpedo gunboats, 948,171*l.* The ships in these classes are those on which alone we could reckon as effective for war service. In the same period

TABLE XIII.—AGGREGATE COST OF CONSTRUCTION OF EFFECTIVE SHIPS.
Completed 1867-68 to 1887-88, under the year of their completion.

Year	Armoured		Protected and partially protected		Torpedo Cruisers and Gunboats		Total Cost of Ships completed	
	Direct	Incidental	Direct	Incidental	Direct	Incidental	Direct	Incidental
1867-68	53,457	£ 3,216	—	—	—	—	£ 1,070,510	£ 198,009
1868-69	1,350,691	134,899	—	—	—	—	1,761,578	216,399
1869-70	371,415	107,566	—	—	—	—	738,323	168,127
1870-71	714,259	68,129	—	—	—	—	931,103	95,220
1871-72	773,873	165,219	—	—	—	—	869,171	183,557
1872-73	267,718	5,451	—	—	—	—	410,739	41,619
1873-74	771,258	76,152	—	—	—	—	1,042,523	132,472
1874-75	239,197	61,570	—	—	—	—	745,174	175,148
1875-76	—	—	—	—	—	—	49,018	60,190
1876-77	682,626	119,404	—	—	—	—	1,036,029	177,788
1877-78	1,481,069	238,785	—	—	—	—	2,412,722	393,869
1878-79	885,918	119,924	—	4,157	—	5,060	1,394,813	293,681
1879-80	414,434	13,374	368,177	13,154	—	—	975,823	142,937
1880-81	531,846	24,816	122,681	4,759	—	—	2,426,215	251,943
1881-82	1,912,964	179,368	246,059	31,834	—	—	851,046	103,676
1882-83	296,761	4,696	368,758	87,032	—	—	680,953	101,564
1883-84	—	—	294,775	46,547	—	—	933,253	166,788
1884-85	530,015	104,527	73,644	17,733	—	—	2,615,754	395,398
1885-86	1,222,499	206,566	1,273,454	188,280	—	—	2,982,845	407,864
1886-87	2,225,759	332,405	190,291	8,717	93,920	4,781	6,755,804	750,750
1887-88	5,006,605	516,964	640,117	113,601	863,272	94,899	32,719,763	4,445,047
	19,713,364	2,462,121	3,615,869	515,814	1,075,709	104,740		
							£37,164,810	

First cost of all ships completed 1867-68 to 1887-88

Total cost—Armoured £22,195,485

Protected and partially

Torpedo cruisers and 4,131,683

gunboats 1,180,449

£27,507,617

Cost of effective combatant ships—

Armoured ships £22,195,485

Protected ships, 'Polyphemus,' 'Mer-

sey,' 'Severn,' and 'Thames,' 753,718

Partially protected ships over 14 knots 825,289

Four ships, 'Leander' type 948,171

Torpedo cruisers and gunboats £24,722,663

£24,722,663

£12,442,147

Expenditure in the period 1868-88 on ships not effective for battle or protection of commerce in war

TABLE XIV.—EXPENDITURE ON ARMOURD CONSTRUCTION.

	ENGLAND					FRANCE				
							Battle-ships	Armoured Cruisers	Coast Defence and Gunboats	Total—Including completing for Sea
1881-82	£	949,313	1881.	.	.	£	521,976	131,900	£	1,037,752
1882-83	.	940,710	1882.	.	.	.	933,200	91,640	56,160	1,081,000
1883-84	.	1,260,137	1883.	.	.	.	1,005,685	133,236	44,000	1,182,921
1884-85	.	1,517,727	1884.	.	.	.	931,524	52,423	168,227	1,152,174
1885-86	.	1,878,214	1885.	.	.	.	793,720	51,360	180,280	1,025,360
1886-87	.	1,539,218	1886.	.	.	.	765,982	—	104,945	870,927
1887-88	.	1,995,097	1887.	.	.	.	510,000	—	79,012	589,012
1888-89	.	753,000	1888.	.	.	.	545,176	39,800	113,412	698,388
	.		1889.	.	.	.	473,839	139,328	89,700	702,867

Expenditure in the period 1868-88 on ships not effective for battle or protection of commerce in war

Four ships, "Leander" type . . . 948,171
Torpedo cruisers and gunboats . . . £24,722,863

£27,507,617

gunboats

1881-82

£24,722,863

£12,442,147

the cost of other vessels, constructed mainly for peace purposes, was over 12,000,000%. We must to some extent build for the police of the seas, and the service of the ports. We have gone too far in this direction in the past.

Having now reviewed our present strength and our past expenditure, I address myself to the more practical and more difficult task of suggesting a programme for the future.

Necessity
for repairs
to older
ironclads

I would place in the very front of those requirements for which a special grant should be asked, the work, too long delayed, of putting our existing fleet of effective ships in a condition to render service. We have been habitually remiss in the repair of boilers. A large proportion of our ships in commission are worked at a reduced pressure and are quite unable to maintain the speed for which they were designed. There are some gratifying exceptions. The 'Alexandra,' the flagship of the Duke of Edinburgh, is a pattern of what ought to be done and can be done to maintain the speed of a first-class man-of-war. In the manoeuvres of last year it was a sorry sight to see the 'Rupert' and the 'Black Prince' left behind, the one in Lough Swilly and the other at Berehaven. Nearly a thousand men were practically *hors de combat* because their ships could not keep up with the fleet. The French have not allowed their ships to lose speed through worn-out boilers. Admiral Krantz, the present Minister of Marine, has signalised his administration by taking in hand every ship that France now has in reserve, and making her fit for service. The desirability of re-boiling the 'Northumberland' class has already been insisted upon. All our ironclads not of the most recent date should be similarly treated. With triple-expansion engines and

modernised armament they would be well able to meet the ironclads of other Powers of the same period and the same type. In the event of war, the latest ships would not be spared from European waters for expeditions to distant seas. I strongly recommend the grant of a million and a half for the essential work of rehabilitating and bringing up to modern requirements numerous ships, which, for certain important duties of the Navy, are only obsolete in their machinery and armament.

There is little room for difference of opinion as to the necessity for making good the long arrears of repairs and refits. When we turn to the consideration of the amount of new construction required, it is far more difficult to be precise. Civilians can but compare and collate the advice tendered to the country by the gallant officers of the Navy and by those men of science whose skill in invention has created an enormous difficulty for the naval administration of the present day.

In suggesting a programme of new construction it will be necessary to begin with the battle-ships. In war the place of the British ships would be in the face of those of the enemy wherever they might be. If we have commanding strength the enemy will retire into port and await the chance of sending a fast vessel to sea from time to time, to make raids upon our trade. In this case the British squadron of the future will have to perform the same duty which was undertaken in the days of our forefathers—they will have to keep watch from the offing. They must be prepared at any moment for battle, in numbers sufficient to make sure of victory. This was Nelson's principle. How seriously the difficulty of maintaining a close blockade has been enhanced by the introduction of steam was explained by Sir Geoffrey Hornby in his paper read in May last before

Duties of
battle-ships
in war

this Chamber. This difficulty was shortly afterwards illustrated in practice in the manœuvres on the coast of Ireland. To maintain a blockading squadron of a given strength off a port, under the conditions of steam, Admiral Hornby told us that there should be a force in reserve equal to the number present off the enemy's port. The blockading ships must draw constantly on their supplies of coals, and must be relieved at frequent intervals.

More
battle-ships
required

Adopting Admiral Hornby's view, it is evident that we have no sufficient superiority to provide for an effective blockade of the ships of a single Power, still less of those of a combination of Powers. In numbers and tonnage the ships in the Tables I. and II. show a near approach to equality, and it is important to remember that the force of the combined Powers includes a larger proportion of modern ships than we could muster under the British flag. Strength for battle is, in the opinion of all naval officers, the first consideration. A reinforcement of our fleet with four first-class ironclads and ten vessels of the second class, as proposed by Lord Charles Beresford, cannot be regarded as an exaggerated demand. We may take the cost of building these, as estimated by Lord Charles Beresford, at 7,500,000*l.* The time required to complete would be from three to four years. How is the money to be provided, say in four years?

For the building of armoured vessels in 1888-89, we have taken in the Navy Estimates 756,191*l.* as against 777,867*l.* taken in the French Estimates for the same service. In four years our present appropriation would give us, roughly, 3,000,000*l.* for building ironclads. We require, therefore, a special grant of 4,500,000*l.* spread over four years.

Amount
for repairs

In addition, I have proposed to spend 1,500,000*l.*, spread over three years, for necessary repairs of the older ironclads. Thus the special programme described

would add to the present Estimates for three years 1,625,000*l.* and for a fourth year 1,125,000*l.* The special programme being completed, under normal conditions, we should do twice as much as the French in the construction of battle-ships.

Turning from ironclads to unarmoured vessels for protection of commerce, what are the duties which the Navy might be called upon to undertake? Under the apprehension of war with Russia, the Admiralty, of which I had the honour to be a member, despatched British cruisers to watch every port where a cruiser under the Russian flag was to be found. As in the case of battle-ships, so in the case of cruisers, to seal up the enemy would clearly be the most effective method of giving protection to our trade. It has, however, been made clear in the manœuvres, both at Berehaven and at Lough Swilly, that a blockade can hardly be so close as to render it impossible for fast vessels to escape. For this contingency further provision must be made. Sir Arthur Hood told a Committee of the House of Commons that the Navy ought to be able to protect certain great routes along which our trade passes. Admiral Hornby specially directed attention, in his paper of last year, to the trade with the East by the Cape and Suez Canal. He proposed a plan of protection by groups of ships operating from certain strategical positions, and suggested that at certain points on the route up the Mediterranean convoys might be resorted to. Admiral Hornby made a formidable demand of 556 cruisers. Our existing force is a small instalment of what Admiral Hornby asked for, and showed to be desirable. By recent efforts, however, we have greatly strengthened our fleet in cruisers. Our amount of building, as proposed in the Estimates for 1888-89, is double that of France (see Table XV., pp. 222-28).

Duties
of un-
armoured
vessels

Defence of
commerce

ACTUAL STRENGTH OF THE BRITISH NAVY 223

Australia . Galatea . Narcissus . Immortalité . Aurora . Orlando . Undaunted .	— — — — — — —	— — — — — — —	ARMoured CRUISERS				22,400 4,092	44,800 8,184	59,852 —	127,052 12,276
			17,828	Dupuy de Lôme	N	* * *				
			20,840							
			20,559							
			24,323							
Blake . Hlenheim . Vulcan . (Torpedo Depot Ship)	— — — —	— — — —	ARMoured CRUISERS				26,492	52,984	59,852	139,328
			153,614							
Coccyte . Phlegeton . Styx .	— — —	— — —	ARMoured GUNBOATS				7,800 14,300 7,800	15,600 28,600 15,600	— — —	33,400 42,900 23,400
Tage . Cecile .	— —	— —	UNARMoured—FRIGATES				— 1,412	— 2,824	78,721 65,600	78,721 69,836
Alger . Isly . Jean Bart	— — —	— — —	FIRST-CLASS CRUISERS				16,380 21,680 34,145	32,760 43,360 68,290	46,360 — —	95,500 65,040 102,435
			142,680							
			100,000							
			132,754							
			375,434							
Torpedo Depot Ship)	— — — — —	— — — — —	UNARMoured—FRIGATES				72,205	144,410	46,360	262,975

135,244 270,488 68,107 473,839

602,577

214,104

388,473

I.	SLOOPS				10,119	20,238	138,441	168,798
Daphne .	—	—	17,155	—				
Nymphe .	—	—	17,154	—				
Beagle .	—	—	43,064	—				
Basilisk .	—	—	33,044	—				
Melita .	—	—	23,233	—				
	—	—	133,650	—				
			FIRST-CLASS GUNBOATS					
Pheasant	—	—	15,260	—				
Partridge	—	—	16,629	—				
Peacock .	—	—	12,155	—				
Plover .	—	—	15,205	—				
Pigeon .	—	—	13,895	—				
Pigmy .	—	—	17,453	—				
Magpie .	—	—	25,344	—				
Redbreast	—	—	23,244	—				
Redpole .	—	—	23,014	—				
Widgeon .	—	—	23,656	—				
Lapwing .	—	—	30,024	—				
Ringdove	—	—	30,024	—				
Goldfinch	—	—	27,687	—				
Sparrow .	—	—	28,507	—				
Thrush .	—	—	28,507	—				
	—	—	330,604	—				
			TORPEDO CRUISERS					
			Vautour .		5,507	11,014	—	16,521
			Wattignies		9,900	19,800	12,000	41,700
					15,407	30,814	12,000	58,221

TABLE XV.—(continued).
UNARMOURED (continued).

ENGLAND				FRANCE			
Name of Ship	Estimated Expenditure		Total	Name of Ship	Estimated Expenditure		
	Dockyard	Contract			Labour	Materials and Yard Manufacture	Contract
	£	£	£		£	£	£
Spider . . .	—	—	2,822	TORPEDO GUNBOATS	—	—	—
Sandfly . . .	—	—	2,822		—	—	—
Grasshopper . . .	—	—	2,780		—	—	—
Sharpshooter . . .	—	—	36,620		—	—	—
Spanker . . .	—	—	35,837		—	—	—
Speedwell . . .	—	—	35,527		—	—	—
Salamander . . .	—	—	33,813		—	—	—
Seagull . . .	—	—	33,813		—	—	—
Sheldrake . . .	—	—	32,813		—	—	—
Skipjack . . .	—	—	35,687		—	—	—
N.B.—Two additional vessels, Sharpshooter type, have been ordered.			252,534				

[illegible]

TABLE XV.—(continued). SUMMARY.

		ENGLAND		FRANCE	
		No. of Ships	Expenditure £	No. of Ships	Expenditure £
Armoured.	Battle-ships	11	602,577	7	473,839
	Cruisers	7	153,614	2	139,328
	Armoured gunboats	Nil	—	3	89,700
	Total	18	756,191	12	702,867
Unarmoured	First-class cruisers, torpedo Depôt ship and frigates	3	375,434	5	411,532
	Second-class cruisers	6	386,965	2	93,300
	Third-class cruisers	7	256,200	6	168,798
	Sloops	5	133,650	Nil	Nil
	First-class gunboats	15	330,604	Nil	Nil
	Torpedo cruisers	Nil	Nil	2	58,221
	Torpedo gunboats	10 and 2 ordered	252,524	Nil	Nil
	Torpedo sloops	Nil	Nil	2	56,900
	Torpedo boats	16	81,050	63	138,372
	Surveying ship, sailing brig and yard craft	—	70,341	3 sailing frigates	6,156
	Sundry expenditure, including sum for gun mountings	—	57,311	Sundries	123,638
	Total unarmoured . . . . .	. . . . .	1,944,079	—	1,056,817
	Total armoured from above . . . . .	. . . . .	756,191	—	702,867
	* Total new construction as given in Navy Estimate . . . . .	. . . . .	2,700,270	—	1,759,684
	Australasian squadron . . . . .	. . . . .	360,730	—	—
* Grand Total as given in First Lord's Memo. to the Committee on Navy Estimates . . . . .		. . . . .	3,061,000	—	—

We may, perhaps, rest content if this ratio is maintained. We could build with the present provision two first-class cruisers, 'Blake' or 'Warspite' type, four 'Merseys' and ten 'Sharpshooters' annually.

In connection with the defence of commerce it would be absolutely necessary to retain the command of the Channel and its approaches. For this duty we must rely on ships of greater power than cruisers. The special programme of armoured construction will give a valuable reinforcement in the class of vessels we should most need for the protection of our trade in the Channel and along the entire route to the Suez Canal.

In considering the programme of unarmoured building, the valuable assistance to be obtained from the mercantile marine for its own protection against merchant steamers converted into cruisers cannot be put out of view. All the other leading maritime Powers—Italy, Germany, the United States and France—have by liberal subsidies given encouragement to the building of steamships capable of conversion into cruisers. The present Government have wisely adopted a similar policy. At a relatively small cost, amounting for the present year to 26,000*l.*, six ships of exceptional speed have been specially retained for the public service. Nine others are also at the disposal of the Admiralty. In the two new White Star liners the construction has been specially considered with reference to protection in case of war service. It would always be advantageous for the Admiralty to come to terms with shipowners in the early stage of the construction of ships, with the view to secure the best constructive arrangements at the cheapest cost.

Mercantile
auxiliaries

It is with sincere reluctance that I lend as much support as I am able to give to the demand for an

Reason
for advo-
cating
increased
expenditure

increase of expenditure—even on the Navy. To spend vast sums on preparations for war, is to deprive peace of half its blessings. As a politician I could not reconcile it to my sense of duty to come here to urge proposals prompted merely by a spirit of aggression ; but when the forward movement has been taken elsewhere, and it has become evidently necessary to strengthen the fleet for the defence of the colonies, and the vast interests created by our peaceful and beneficent enterprise, as carriers of the trade of the world, the question presents itself under a different aspect. If we ask ourselves why the special programme produced by Lord Northbrook, and that which, as we anticipate, will be laid before Parliament by the present Admiralty, are necessary, the answer is to be found in the retrospective view which I have given of our expenditure in the past.

I have quoted the authority of Lord George Hamilton, to the effect that for a period of six years our expenditure was in dangerous approximation to that of the French. In 1884 we had much lee-way to make up. Lord Northbrook partly made good what was wanting. There is still a wide gap in our armour which should be filled up. The country has been prepared for the demand we are now pressing on the Admiralty by the voice of the Chancellor of the Exchequer. In a speech lately delivered at Birmingham he appealed to the patriotism of the democracy, saying in words of truth and eloquence that you cannot have empire without sacrifice.

In my opening words, I paid to those who have been working for the Navy outside the Admiralty the tribute they deserve. It would be unfair and ungenerous to render no acknowledgment to the seamen and civilians who have been serving their country with untiring devotion and conspicuous ability in the present Board of

Admiralty. They have passed through an ordeal of examination and cross-examination before committees and commissions, such as their predecessors have never had to face, and they have come out of it with credit. They have done the best that could be done with the resources placed at their disposal. The initiative in any great movement of extension must always come from the country.

XX

NAVAL CONSTRUCTION AND PERSONNEL

SPEECH IN THE HOUSE OF LORDS, MARCH 10 1893

LORD BRASSEY, in rising to call attention to the state of the Navy in relation to ships building and the resources for manning the fleet, said that those who had had the privilege of serving at the Admiralty must always watch with interest the work of that important department; and as their lordships had the advantage of the presence of the First Lord in the House, he hoped that, in raising a discussion with reference to the Navy, he might command their lordships' approval. The two points with which he desired to deal were shipbuilding and manning. The Navy Estimates for 1893-94 provided for shipbuilding a total of 4,621,774*l*. From the close approximation of those figures to the figures for 1892-93, it was evident that Earl Spencer adhered in the main to the policy of his predecessors. In protecting the great department over which he presided from a premature reduction of Estimates the noble earl had done a public service.

Policy
of late
Board

The late Board submitted to Parliament a programme of construction extending over a period of five years. That course had not been followed by the present Board. It was most desirable that a continuous policy should be pursued in relation to the Navy. There were objec-

tions—he did not say insuperable objections—to fixing a programme by Act of Parliament which fettered the discretion of future Administrations. The necessity for sustained efforts on our part had been created by the action taken by other Powers, not dependent in an equal degree with ourselves upon a Navy for protection from invasion and for the security of their trade.

The expenditure of France in the construction of new ships had averaged for the last three years 2,800,000*l*. It was officially stated that an increased expenditure must be looked for in the future. The expenditure of Russia on shipbuilding had been rapidly increasing. For the present year it stood at 2,674,000*l*. It was laid down by Lord George Hamilton, with the approval of Parliament, that the standard of strength at which the Navy of England ought to be maintained was that of equality to any two other Powers. The combined expenditure of France and Russia being some five and a half millions, the Board of Admiralty would not have been warranted in proposing a less sum for shipbuilding than that now submitted. Our naval preparations were not in that state of advancement which could alone have justified us in resting on our oars, while other Powers were pushing forward the reinforcement of their fleets.

Comparing our strength in ships, built and building, with the combined strength of France and Russia, our relative position might be briefly summarised. In first-class battle-ships we had an advantage, though not more than was sufficient to give protection to our enormous maritime interests. In second-class battle-ships we had a sensible inferiority. In the French list, however, were included six ships built of wood, of which the oldest was launched in 1865. In coast defence we were weak ; but these ships under the flags of foreign Powers were for the

French
and Rus-
sian expen-
diture on
construction

Comparative
strength

most part not capable of keeping the sea. They could not engage in offensive operations against an enemy's coasts. In cruisers of the new armoured class we greatly needed reinforcement. In the protected classes the efforts lately put forth had placed us in a good position.

New programme
of construction

Having dealt with expenditure, we had now to consider the several types of ships in the new programme. The list included two first-class battle-ships, to be called the 'Magnificent' and the 'Majestic,' one smaller first-class ship, the 'Renown,' two first-class cruisers, three second-class cruisers, two sloops, and fourteen torpedo-boat destroyers. The 'Renown,' the battle-ship already laid down by the present Admiralty, was designed as an improvement on the two smaller first-class battle-ships 'Centurion' and 'Barfleur,' laid down by the late Board. In the new vessel the displacement was increased from 10,500 to 12,250 tons. The guns were more fully protected. To obtain this protection it might have been better to reduce the number of guns rather than increase the size and cost of the ship. The two battle-ships which the Admiralty proposed to commence in the dockyards were of the 'Royal Sovereign' type—of which eight were laid down under the late Board. The 'Royal Sovereigns' were highly approved in the Navy. There were cogent arguments against throwing all our resources into the construction of ships displacing more than 14,000 tons, and which, with their armament, would cost in round figures a million sterling. The two new ships were to be still larger and more costly than their predecessors. Increase of dimensions enabled the naval architect to give more armour, more armament, more speed, more coal capacity. With every addition to tonnage, we suffered increasingly the disadvantage of having too many eggs in one basket. The gun, the ram,

Argument
against
increased
dimensions

and the torpedo were the weapons of naval warfare. Hugeness of size did not secure invulnerability even from projectiles. It gave no advantage, but rather the contrary, whether for dealing or avoiding a blow with the ram or the torpedo. It increased rather than lessened the risk of a disaster such as that which had befallen the 'Howe.'

If we looked to the shipbuilding policy of other Powers, we found that the French had with great reluctance followed us in adding to dimensions. Their ships of the 'Hoche' type, the contemporaries of our own 'Admiral' class, did not exceed that class in tonnage. When we advanced from the 10,600 tons of the 'Admirals' to the 14,150 tons of our latest first-class ships, France laid down three ships of 11,880 tons. The latest designs, the 'Bouvet' and 'Massena,' were somewhat larger. Russia and Germany had kept the tonnage of their largest ironclads below 11,000 tons. In Italy, it had now been decided to build no more monster ships, but to lay down in lieu of them such vessels as the 'Admiral San Bon,' of 9,800 tons, of great speed, specially adapted to the Mediterranean. No less than eight 'Royal Sovereigns' having recently been built it would have been preferable on many grounds that they should now have been followed up by vessels of more moderate dimensions.

Passing from shipbuilding to reconstruction and repair, the programme included nine ships which it was well worth while to take in hand. The hulls being in perfect condition, it was much to be regretted that the opportunity should not have been used for supplying to all these vessels powerful engines of modern pattern. Our older ships might no longer be fit for the line of battle ; they were not obsolete as cruisers, especially for

French and
Italian
new types

Improvements to
older iron-
clads

the defence of the trade between the Cape, India, the farthest East, and Australasia. It was not likely that the newest ships of a hostile Power would be found in those distant waters. With improved machinery, such vessels as the 'Agincourt,' 'Achilles,' and the 'Northumberland' would steam 16 knots. For service as cruisers their heavy muzzle-loaders should be removed and replaced with light breech-loading guns. The change would give more disposable weight for coal-supply, and allow of a reduction in the complements. The last was a most important consideration, having in view the nature of the duties for which the ships would be most available.

Armoured
cruisers

Rurik'

Turning to cruisers, special attention was now being given in foreign navies to an armoured type which it was difficult to differentiate from the battle-ships. For many years Russia had been leading the way in building armoured cruisers. The 'Rurik,' now approaching completion, had a displacement of 11,000 tons, a speed of 18 knots, and was well protected by armour. Three ships of the 'Rurik' type were in progress for the Russian Navy. The French had already built one cruiser. They were completing another, and were laying down two more ships, considerably smaller in tonnage than the 'Rurik,' but similarly protected. Two ships of the 'Rurik' class and five smaller ships of 7,000 tons were in course of construction for Spain. The type was represented in the United States Navy by the 'New York' and the 'Brooklyn.'

New
British
cruisers

With these remarkable developments in the power of cutting up commerce, the Admiralty was well advised in building vessels capable of meeting the cruisers in hand elsewhere, and for which at present the British Navy had no match. It was promised that the two new first-

class cruisers were to surpass in speed, coal-supply, armament, and armour, any cruisers built or building. It was a question whether two more vessels of the same powerful type might not with advantage have been substituted for one of the new first-class battle-ships. The laying-down programme included, in addition to the first-class cruisers, three ships of 5,500 tons, which were to be improvements on the 'Astræa' class. The new vessels would be nearly 2,000 tons larger than the first batch of second-class cruisers laid down by the late Board.

All the ships lately built for the Navy were valuable additions, but it was certain that for the duties of ocean cruisers the larger protected ships of the Hamilton programme were relatively the most efficient, whether they looked to speed, to protection, or ability to keep the sea. In the improved 'Astræa' the coal capacity was increased from 400 to 550 tons. On a displacement of 5,500 tons, it was most desirable, and it should be possible, to carry a more ample supply. In this connection it seemed to be appropriate to refer to the subsidising of merchant cruisers.

At a time when foreign Powers were giving encouragement with a lavish hand to the construction of fast steamers, the support of the State could not safely be withdrawn from those British shipowners who were prepared to build vessels suitable for conversion into cruisers. No merchant steamer could be a match for a regularly built vessel of war; but if the contingency of war were more carefully considered in the original design much might be done to improve the means of protection. If deficient in protection, the merchant cruisers had a great superiority in speed. He need not trouble their lordships with detailed observations on the torpedo

Auxiliary
merchant
cruisers

flotilla. The Admiralty had decided to meet torpedo-boat attack with torpedo-boat destroyers. They had been wise in not yielding to the demand for a great increase in mere torpedo boats.

Manning

Having dealt with the shipbuilding programme, it became necessary to examine our resources for manning the fleet. The energy recently directed to construction involved an addition to the seamen and marines. The effective ships now on the Navy List would probably require not less than 100,000 men. He should be glad to know the exact figures from the First Lord of the Admiralty. How many men were actually available? Provision was made in the Navy Estimates for 70,493 available for sea service. They had 3,010 in the Seamen and Marine Pensioners' Reserve. The Royal Navy Reserve had a strength of 1,100 officers and 20,900 men, nearly equally divided between the first and second class. In addition to the seamen they had 1,200 firemen.

Wanted, a reserve of seamen

It would be seen that we were barely able to man all the ships on the effective list. There was no reserve to make good the loss by wastage which in time of war was sure to be constant and large. On the other hand, the numbers were in excess of peace requirements and our facilities for training at sea. In the last ten years they had added more than 15,000 men to the permanent force and had increased the votes for wages and victualling by 1,266,000*l.* a year. If the present policy in relation to the manning of the Navy was pursued, it was evident that a burden would be laid on the taxpayers only to be justified by imperative necessity. There was no such necessity. They might safely put confidence in the mercantile marine as a second line of defence standing behind the Navy. There was no reason to doubt the efficiency of a trained and well-drilled reserve. As to the loyalty

of the men to their engagements if called upon to serve, Sir George Tryon's committee spoke with full confidence. These considerations pointed clearly to a reinforcement of the Naval Reserve. Under the Act of 1859 the Admiralty were empowered to raise 30,000 men. A reserve of 1,000 officers, 12,500 seamen in the first class, 12,500 in the second class, and 5,000 firemen was the smallest force with which they should be satisfied. There would be no difficulty in raising the strength of the Naval Reserve. As estimated by Sir George Tryon's committee, they had in the merchant service approximately 40,000 men eligible for the first-class reserve, and 70,000 men regularly, and 40,000 others occasionally, engaged in the fishing industry. No fewer than 24,000 men were employed as firemen and trimmers.

An increase
to the
Naval
Reserve

In dealing with the manning of our own Navy, their lordships might with advantage take into view the systems long established and successfully worked in other countries, and especially in France. The British was the only Navy whose ships were completely manned with seamen trained for the service from boyhood and engaged for a long term of years. In France, out of a total force actually embarked in the ships in commission, 25,000 were entered as full-grown men from the Inscription Maritime. The seamen-gunners, torpedo men, engine-room artificers, and firemen were obtained by voluntary enlistment. The special ratings formed perhaps a quarter of the total complements. For the general duties of a man-of-war's man, French naval officers were well satisfied with the men obtained from the Inscription. It was estimated that 100,000 able-

French
system of
manning

lied seafaring men could be supplied to the fleet from this source. In England, where naval and military service was voluntary, pay and retainers must be fixed

on a liberal scale. In all other respects the organisation of the French Inscription Maritime might be studied in this country with good effect.

If he had trespassed upon the patience of the House at some length, he might urge that the manning of the Navy more largely from the Reserve was a question in which a civilian might interpose with advantage. Among the officers of the Navy there was a natural preference for the well-drilled force, which the continuous service system placed in their hands. It was the part of the statesmen to appreciate how serious was the waste of public money and how yet more grievous the waste of valuable human energy, in attempting to maintain our men in peace at the full numbers required in war. They should look more confidently to the reserves which the mercantile marine could supply.

PART II

SHIPBUILDING

I

UNARMOURED SHIPS

PAMPHLET PUBLISHED IN 1875

THE duties and services which vessels of war are required to perform are so various in their nature that it is altogether impossible that the same classes of ships can be advantageously employed both in line of battle and for the police of the seas. It will accordingly be more convenient, in discussing the shipbuilding policy of the Navy, to divide the armoured from the unarmoured classes.

In the following pages it is proposed to consider what types are best adapted for the protection of commerce, and for maintaining our communications in time of war. These are duties for which speed, both under sail and steam, and seaworthiness under every condition of weather—in short, all the qualities which tend to make a ship ubiquitous—are essential. If it is desired to combine them with moderate tonnage, armour must be abandoned.

The construction of an armoured fleet does not make unarmoured ships the less necessary. The House of Commons was cautioned by Lord Clarence Paget, in moving the Naval Estimates in 1864, that it would be

Un-
armoured
ships indis-
pensable

I.

R

a mere deception of the public to pretend that the increase of the armour-plated vessels would lead to any diminution in the number of unarmoured ships.

Our commerce the special object of attack

The protection of commerce would certainly be a difficult task for our Navy in the event of war. The ablest officers in the French service have abandoned the idea of contending, to use the words of Baron Grivel, with the '20,000 guns of our fighting Navy.' Their aim would be to pursue the '50,000 merchant ships' which are continually engaged in transporting the wealth of England over the watery plain. They believe that the French fleet could carry on for an indefinite period a privateering war, and that the immediate result would be a rise in the rates of insurance and the transfer of much of the carrying business of the sea from British ships to foreign flags. They assume that the great source of our national prosperity would thus be destroyed, and that a state of commercial and financial suffering would ensue, of which the sagacious and far-seeing men who direct the government of England would soon grow weary.

Policy of United States

The same policy would be adopted by the United States. They have hitherto declined to engage in a costly rivalry with the maritime Powers of the Old World by constructing the armoured ships, until lately regarded as indispensable to a fleet designed to engage an enemy in line of battle. Their views as to the kind of maritime operations they could undertake with the greatest prospect of success appear to coincide exactly with the plans propounded by Baron Grivel. In the 'Congressional Globe' report of the proceedings in the United States Congress of December 4, 1872, the evidence is quoted which had recently been given by Admiral Porter before the Committee of Congress on the

decline of commerce. He had been asked the following question : ' I understand you to say that if, at the commencement of the late war, we had had thirty steamers like those running to New York from Europe, they would have been as efficient as our entire Navy ? ' He replied : ' Twice as efficient. I say that without hesitation. The ships we had could catch nothing. We never had a vessel that could run down a blockade-runner during the whole war, except the " Vanderbilt " and two others. Our ironclads are only suitable for harbour defence. In case of war with Great Britain or France, our powers would be exerted in cutting up their commerce. Great Britain could not stand a war six months with the fleet of ships we could send out after her vessels. They would break her up, root and branch, and that kind of warfare would be more likely to bring about peace than fighting with ironclads or heavy war vessels. '

Assuming, therefore, that in the event of war our commerce would be the principal object of attack, it is important to consider what types or classes of ships are the best adapted to protect our commerce, to keep open our communications with our foreign settlements, and to convoy the supplies of food from abroad, which are indispensably necessary to the sustenance of our population.

For such a service we do not want large and costly ships. The class of vessels required for the vedettes and sentries of a fleet of line-of-battle ships, to do for the fleet what the cavalry does for an army, requires more consideration than has yet been given on the subject. The sailing fleets of olden times were attended by a numerous flotilla of corvettes, brigs, gunboats, and cutters. In the present day the screw ship of the line has

The classes
of ships
best
adapted for
the protec-
tion of
commerce

Not large
ships

acquired the same mobility as the smallest and lightest vessel ; but just as in military operations on land a whole battalion should not be told off to take the post of a sentry, nor a regiment of cavalry to escort a solitary staff officer, nor 130 pieces of cannon to convoy a letter, so it would be a culpable waste of power to employ powerful and costly ships in services of secondary importance.

Swift, handy
vessels
wanted

A general concurrence of opinion can be shown to exist on this question abroad and at home, and both in and out of Parliament. In the debate on the Navy Estimates of 1866, Mr. Hanbury Tracy said there was 'a prevalent impression throughout the Navy that fast sea-going cruisers and despatch boats were what we wanted for the safety of our commerce. The cruising vessels should be able to go thirteen to fourteen knots, while the despatch vessels should have a speed of from fifteen to sixteen knots.' In the same debate Mr. Graves said that 'we wanted swift handy vessels of moderate size, capable of remaining at sea twelve months under canvas, and of steaming at a high rate of speed on an emergency.' We require for cruising purposes, for showing the British flag in foreign ports in time of peace, and for protecting our commerce in time of war, vessels of the 'Alabama' class, or of the far more formidable class of the 'Amethyst' type, of 1,900 tons, 350 horsepower, and 14 guns. Such vessels can be built for 70,000*l.*, and must always be most valuable.

It is admitted that the smaller cruisers must succumb to larger vessels in an engagement ; but it does not follow that the smaller classes are incapable of doing effective service. The prospect of meeting a 'Raleigh' or 'Inconstant' is remote.

Vastum maris æquor arandum.

A ship of small size may have fully repaid her cost by the destruction inflicted on an enemy's commerce, before she meets with an adversary of overwhelming power; and, even then, in an engagement between unarmoured steamers, the chances of firing a fatal shot into the engine-room are about equal for either ship.

For certain important services, and especially for the purpose of securing the means of escape from a more formidable ironclad by superior speed, a larger class of ships may be required; but if the same qualities of speed can be obtained in the smaller ships, even though they mount fewer guns, there is much to be said in their favour. The 'Inconstant' is necessarily an expensive ship for the service she is intended to perform. The original cost was 214,000*l.*, with a subsequent expenditure of 20,000*l.* for repairs. It was in consequence of the representations of Admiral Porter that the proposal of a subsidy to ocean-going merchant steamers was entertained by Congress. If the privateers, with which we may have to deal, are mail steamers converted into lightly armed men-of-war, it is not necessary for us to build, at an enormous cost, special vessels, such as the 'Shah,' or the 'Raleigh,' when, as Captain Waddilove has pointed out, we might employ the Cunard steamers, which would be much more efficient, for the same service. If the Cunard steamers cannot attain the extreme speed of the 'Raleigh,' they can maintain a speed of 14 knots for a much longer period; and in coal-carrying capacity they are infinitely superior.

It is not probable that privateering would be undertaken by men of large capital, who would be disposed to spend considerable sums on individual ships. The more reasonable presumption is that the privateers would be of moderate size, of high but not extreme speed, rarely

Why some
larger
ships
required

Privateers
would not
be of large
tonnage

exceeding 12 to 13 knots, and that they would be formidable, not so much from their numbers or their individual power, as from the exceeding difficulty of intercepting and pursuing them. They would avoid probably the most frequented tracks, where alone the six 'Inconstants' demanded by Sir Spencer Robinson could be employed, while our commerce would be imperilled in every other part of the world.

To protect
commerce
numbers
more
necessary
than ex-
treme
speed

To sweep the seas in search of these wasps it would be essential to send forth a numerous fleet. The 'Inconstant' could never venture to use her extreme speed when cruising in search of an enemy. Her speed when cruising would be about the same, and therefore her powers of ranging over the ocean would not exceed those of the 'Volage'; and, if the speed of the 'Volage' is adequate for the purpose, it is obvious that the protection of our commerce would be twice as effective, if we had double the number of ships.

Large
tonnage
not
essential
for high
speed

Assuming, however, that extreme speed is required, it by no means follows that large tonnage is a necessity. The fastest vessel in the Navy, the yacht 'Osborne', is a comparatively small ship. The fastest ships in the merchant service are the steamers carrying the mails between Holyhead and Kingstown, and the blockade-runners which, during the war of the secession, escaped the United States cruisers by their superior speed. All these are ships of moderate size, when compared with the 'Inconstant.' Her measured mile speed is such that she could escape from any ironclad that has been built; but unfortunately, at her extreme rate, she can only carry a supply of coal for $2\frac{1}{4}$ days' steaming. At the comparatively slow speed of 10 knots an hour, the 'Inconstant' can only carry coal for a distance of 2,160 miles, and could not therefore cross the Atlantic even

at the moderate rate of 10 knots from Liverpool to New York.

Whatever be the rate attained on the measured mile, when cruising in search of an enemy the speed of unarmoured vessels will seldom be allowed to exceed 10 knots. The great consumption of coal at higher speeds will make it impossible to exert the full power of the engines, except when giving chase to an enemy. So again, if a fleet were despatched on the outbreak of war to take up a position at sea, for the purpose of intercepting the commerce of an enemy, or if ships were sent across the ocean to blockade an enemy's coast, the speed would not be allowed on the voyage to exceed 10 knots.

The cruising speed will not exceed 10 knots

I quote the following figures from Mr. Reed's tables, which show clearly that the speeds attained on trial can only be attempted on rare occasions, such as the extreme emergency of battle, or the pursuit of an armed ship of an enemy.

—	Coal supply	Speed of 12½ knots		Speed of 11 knots	
		Time Dys. hrs.	Distance Miles	Time Dys. hrs.	Distance Miles
Achilles . .	620	3 19	1,140	6 9	1,680
Bellerophon .	560	4 11	1,340	7 11	1,970
Hercules . .	600	4 14	1,380	7 17	2,030
Monarch . .	600	5 5	1,560	8 18	2,310

It may be doubted whether the tendency, so general among naval officers, to sacrifice every consideration, not even excepting a powerful armament, to speed is wise and justifiable.

Too much sometimes sacrificed to obtain extreme speed

In the debate of 1866 on the Navy Estimates, Lord Clarence Paget told the House of Commons that 'for our police of the seas we are obliged to employ small vessels, which would be like the brigs used in the last European naval war,' adding that he had 'never heard

that these brigs were condemned because they could not go as fast as frigates.'

Mr. Corry

The late Mr. Corry, than whom no higher authority on naval administration can be quoted, concurred in the view of Lord Clarence Paget. In the course of the same debate, he said that 'it would be a great saving of future expenditure if it could be shown that efficient sea-going turret ships might be constructed on a much smaller scale, say 3,500 tons.'

A second 'Inconstant' had been provided for in the programme of 1867-68 ; but, on Mr. Corry becoming First Lord, it was resolved instead to build a smaller corvette, the 'Volage.' Mr. Corry, as we are told by Sir Spencer Robinson, believed that this ship might be multiplied without extravagant cost, while her speed of 16.128 knots on a six hours' trial trip was rightly regarded as ample for every purpose.

Admiral
Porter

From the United States I may quote the high authority of Admiral Porter as an advocate of small ships for the protection of commerce. In his report of 1871-72, after calling attention to the progress of the principal navies of Europe, he proposed to take steps to make good the great deficiency of the United States Navy in cruising vessels, not by constructing 'Inconstants,' but by building twelve wooden vessels of not over 1,000 tons each, and six or eight similar ships of iron. They were to be full-rigged ships, with fine sailing models and good steam power, the propellers to hoist up ; and all were to be exactly alike.

Mr.
Barnaby

We find our own naval constructors expressing their entire concurrence in a policy of moderate dimensions. Mr. Barnaby, in a paper read in 1874 before the Institution of Naval Architects, described the gunboats of the 'Coquette' class of 400 tons and 60 horse-power,

and the sloops of the 'Arab' class, 600 tons, and the 'Daring' class, 900 tons. All these vessels had an average speed of $9\frac{1}{2}$ to 10 knots. He pointed out that the relative cost of these several types was as 4, $7\frac{1}{2}$, and 9 respectively, and that they were perfectly adapted for the various duties incidental to general foreign service. When, however, it became necessary to provide for an increase of speed to 13 knots—the lowest speed admissible in ships intended to protect commerce and destroy privateers—the displacement must be doubled, the horse-power trebled, and the cost of the vessels increased in the proportion of $21\frac{1}{2}$ to 9. All this had actually been done in the 'Magicienne' class. Now, the question he asked was 'whether we were justified in going beyond the dimensions of the "Magicienne," and whether in the "Rover" and "Bacchante" classes there had not been some sacrifice of the just balance of good qualities, reckoning moderate cost as one of them, in aiming at too high a speed? It is always difficult,' he said 'to content one's self with a working speed, which, we may be satisfied, is on the whole the best, so long as a foreign power possesses ships of a similar class with higher speed. There are always people who are willing to insist upon the enormous superiority of even a slight excess of speed.' Mr. Barnaby believed 'there was a great tendency to exaggeration in that respect, and that a maritime war would show that working speeds of over 12 to 13 knots would be found to have been generally too dearly bought.'

What high
speed entails

This wise caution reflects the greater credit on the judgment of Mr. Barnaby, because there is a natural tendency, from a naval architect's point of view, to exaggerate the importance attaching to speed. Of the many qualities which a man-of-war ought to possess,

Tendency
to ex-
aggerate
the value
of speed

speed under steam is the first, in order of time, which can be distinctly ascertained. Seaworthiness, on the other hand, can only be tested in a long cruise. Hundreds of thousands of pounds may have been sunk in some 'Colossus' of the deep ; but the waste of the public money on ships not capable of rendering services to the country proportionate to their cost is forgotten or ignored, while the widest publicity will certainly be given to any successful trial of speed at the measured mile.

'Rover'
and 'Bac-
chante,'
cost

The 'Rover,' having a displacement of 3,494 tons and 700 nominal horse-power, and the 'Bacchante,' of 3,910 tons and the same horse-power, were designed in 1872 to have a measured-mile speed of 15 knots. In passing from the 'Magicienne' to the 'Rover,' the cost, as stated in Mr. Barnaby's paper, was increased from $21\frac{1}{2}$ to 40, and to 44 in the case of the 'Bacchante.' The cost of the 'Raleigh' was as 50, and that of the 'Shah' as 60. I do not desire to condemn or criticise the 'Bacchante' class, but I venture to hope that we shall not, except under the most urgent necessity, go beyond the 'Rover' in the unarmoured classes. We can build three 'Rovers' for the cost of two ships of the 'Shah' type. In discussing the propositions laid down by Mr. Barnaby, Sir Spencer Robinson did, indeed, assert that a speed of $16\frac{1}{2}$ knots in some unarmoured vessels of the British Navy is essential to our success upon the seas, and an absolute necessity in order to prevent the commerce of the country from being destroyed. But, as Lord Lauderdale truly said, that necessity can only arise where the privateers which threaten our trade with destruction have themselves a speed of $16\frac{1}{2}$ knots. If their speed does not exceed 13 knots—and no vessels available for privateering at pre-

sent exist that can cruise at anything like so high a rate—we may be satisfied with a speed of 14 knots for our own cruisers. By avoiding the too prevalent idea that every man-of-war must be able to steam at an extreme rate of speed, we may be able for the same expenditure to build a much larger number of vessels.

In his speech of 1869 Mr. Childers enumerated among the vessels of the Navy efficient for the protection of commerce twelve corvettes of the 'Blanche' class, with a speed of 13 knots, and carrying $6\frac{1}{2}$ -ton guns; two of the 'Druid' class, with the same speed and armament; twelve gun-vessels with a speed of 11 knots and with $6\frac{1}{2}$ -ton guns; and seventeen new composite gunboats with a speed of 10 knots and $6\frac{1}{2}$ -ton guns. The total unarmoured fleet consisted of 66 vessels, all of which were put forward, and rightly so, as capable of performing valuable service, although not endowed with the quality of extreme speed.

Mr. Childers

If the sole object were to pursue the ordinary vessels of the merchant service, a speed of 12 knots would suffice; but it may be important, as calculated to produce a certain moral effect, to interrupt the regular postal service of an enemy. It will be admitted that the fastest mail steamer does not exceed 14 to 15 knots in smooth water. M. Dislère accordingly suggests that all we want is a somewhat higher speed, and that 15 to $15\frac{1}{2}$ knots is the extreme speed necessary for ships designed to protect or to intercept commerce. 'We should,' he says, 'if we wish to keep within moderate dimensions, be satisfied with the speed strictly necessary to disturb an enemy's commerce. The task of capturing the armed cruisers of the enemy would devolve on a few, a very few ships of extreme speed, such as the "Inconstant" or the "Duquesne."'

Fifteen knots the extreme speed required

Mr.
Goschen

The opinion of Mr. Goschen may be claimed in support of a policy of building smaller ships than those belonging to the 'Bacchante' class. In moving the Navy Estimates in 1872, he said that the Admiralty intended 'to increase the number of the *most useful class of ships that they had at that time*, those of the "Amethyst" class. Besides that, they proposed to commence two covered corvettes of the "Active" and "Volage" class, large unarmoured cruisers, going 15 knots ; for that was a class they thought they could increase with great advantage. They proposed also to complete within the year the frigates "Blonde" (since re-named the "Shah") and "Raleigh" ; but they did not propose to lay down any new frigates. Neither France, Russia, nor Prussia were building any frigates, and it appeared that the time of these large vessels, once a most useful class, had passed away.' It is much to be regretted that the policy indicated in this wisely conceived programme was not more closely followed. The 'Bacchante' class, subsequently introduced, represents an increase, as compared with the 'Active,' of 1,000 tons of load displacement, an advance in the cost of the hull from 80,000*l.* for the 'Active' to 110,000*l.* for the 'Bacchante,' and in the cost of the engines from 39,000*l.* to 72,000*l.* There is, therefore, a total additional cost of 63,000*l.* ; and, if the 'Active' and 'Volage' were of adequate power, our expenditure would have produced a more advantageous result had we confined ourselves to that type instead of incurring a greater expenditure on larger vessels.

Mr. Goschen's proposals for 1872 also included a corvette of the 'Blanche' class, of 6 guns, 1,753 tons displacement, and 350 horse-power, and five sloops of the 'Rinaldo' class, of 7 guns, 951 tons, and 200 horse-

power. It is not quite clear what were the vessels to which Mr. Goschen referred in quoting the 'Rinaldo' as a type. If he alluded to the 'Magicienne' class, it will have been shown already that they were much more powerful than the 'Rinaldo.'

The disproportionate cost of high speed was conspicuously illustrated in the comparison drawn by Mr. Barnaby between the 'Shannon' and the 'Shah.' The relative displacement was 5,000 tons in the armoured, as compared with 5,400 tons in the unarmoured ship. But the horse-power of the ironclad was 3,500, while that of the unarmoured ship was raised to 7,500, the enormous increase being required in order to gain three knots additional speed. Both ships were constructed to carry 12½-ton guns; but in the case of the 'Shannon' the hull and machinery and the two 18-ton bow guns are protected by 9-inch armour. Compared, therefore, with the fast unarmoured ships, the 'Shannon,' in the opinion of Mr. Barnaby, will have all the advantages of a first-class ironclad, and would be as unassailable as the 'Hercules' or the 'Sultan.' It is not pretended that the 'Shannon' would compare with the 'Alexandra,' but then two 'Shannons' can be built for the cost of one 'Alexandra.'

The
'Shannon
and 'Shah

Passing on to the most recent expressions of professional opinion on this subject, I may refer to the principles so forcibly advocated by M. Dislère in his able work, 'La Marine Croisière.' 'The displacement must be limited, both because it is desirable to avoid building unhandy ships, and because it is necessary to distribute the strength of the Navy, so that all its resources may not be concentrated in a few hulls, exposed, the large no less than the small, to the various dangers of navigation and naval combat. We must,

M. Dislère

therefore, give a due proportion to the various elements which all combine to make the cruiser the distant representative of the national power. No one of these elements must be sacrificed to another, which the fashion of the day represents as of primary necessity, such for example as armour protection or extreme speed.'

M. Dislère suggests that the most serviceable cruisers would be vessels armed with two or four 64-pounder guns, with as many guns in addition of a smaller calibre as it would be possible to place on the upper deck. The maximum speed would be 15 knots. The displacement should certainly not exceed 2,900 tons. The loss of a ship of that size would not be such a serious catastrophe as the loss of a vessel like the 'Inconstant' or 'Duquesne,' costing a quarter of a million sterling; and the services performed, so long as the cruisers were restricted within their appropriate sphere, would be much the same whether the vessel were a small corvette or a large frigate of extreme speed.

Admiral
Touchard

The best type of cruiser, according to Admiral Touchard, should be a wooden ship, of greater speed than the majority of the foreign ironclads, more handy under canvas, and costing one-third or one-fourth of the price of the larger ship. That is to say, for the cost of an ironclad cruiser with a covered battery, you would have three or four wooden ships, their guns mounted *en barbette*, of higher speed, and far better adapted than any ironclad for long and distant cruises in time of war.

The
German
Navy

The Germans have not attempted to introduce vessels of the 'Raleigh' type into their Navy. They have three new corvettes, the 'Ariadne,' the 'Freya,' and the 'Louise,' of 1,258 tons and 350 horse-power; and they have one larger vessel of the same dimensions as the 'Magicienne' class, the 'Thusnelda,' of 1,846 tons

and 800 horse-power. The smaller vessels are armed with five 200-pounder guns. Their armament therefore is relatively powerful ; but they are too few in number to engage in aggressive warfare with a first-rate maritime Power.

Our strength in unarmoured cruisers is still in excess of that of any other naval Power. For every 1,000 tons of merchant shipping our fleet of cruisers contains 32 tons, while the proportion which the tonnage of the armoured cruisers bears to every 1,000 tons of merchant shipping is in the French Navy 14 tons, and in the German Navy 4 tons.

Our
relative
strength
in un-
armoured
cruisers

According to the 'Marine-Verordnungs-Blatt,' the German Navy does not aspire to rival that of France, or to give absolute protection to German commerce in time of war. Little has been done, in point of fact, to protect German commerce. The old frigates, such as the 'Hertha' and 'Medusa,' are useless for such a purpose. No originality has yet been exhibited in naval architecture for the German Navy. It has been thought sufficient to repeat the types which we have tried and found successful.

While the naval Powers of central Europe have shown no inclination to enter into competition with England in the construction of more powerful cruisers than our own, the United States have made constant efforts to surpass the navies of other maritime nations in the speed, dimensions, and armament of their cruising ships. In 1855 they made a great stride in advance of anything which had been done before, by building the 'Colorado' and the 'Merrimac,' ships of 4,600 tons, which, however, failed to attain a speed of more than 9.5 knots. The 'Niagara,' from the designs of the celebrated shipbuilder, George Steers, came next. The

The large
American
frigates

dimensions were increased in this case to 5,475 tons, and the maximum speed attained was 12 knots. The English Admiralty followed in the same line by building the 'Doris,' 'Orlando,' 'Mersey,' and 'Galatea,' vessels without a rival in any European Navy. The great advance in the size of the modern frigates is sufficiently proved by the fact that the 'Emerald,' though of moderate dimensions when compared with several frigates built in the later days of wooden ships, was a ship of 2,913 tons, or 31 tons larger than Nelson's famous three-decker, the 'Victory.' The 'Emerald' attained a speed of 13 knots.

Fast
steamers in
merchant
service

In or about the year 1860 some steamers of remarkable speed were introduced into the merchant service. The 'Connaught' and three sister vessels were constructed for the mail service between Holyhead and Kingstown. The 'Connaught' maintained, for six months consecutively, an average speed of 15.45 knots. Among ocean steamers the 'Persia' acquired a just celebrity. On one of her transatlantic trips this vessel maintained an average speed of 12.31 knots throughout the voyage.

New
American
corvettes

During the war with the Secessionists some fast corvettes were ordered for the United States Navy, the Confederate cruisers, though inferior in armament, having been found superior in speed to the ships of the United States Navy. In order to obtain higher speeds vessels of 3,200 tons were laid down. Of these, the 'Guerrière' steamed 12 knots, but the 'Idaho' was a failure, and the result in the case of the 'Wampanoag' must be hereafter described from American sources. Meanwhile, the English Admiralty had become disquieted by the reports which had been circulated relating to the new American corvettes, and in 1865 they

proposed to build seven ships of the 'Inconstant' class. In France some vessels were proposed for a similar service, but of much more moderate dimensions. The 'Château Renard,' of 1,900 tons and a speed of 14 knots, is an example of the type adopted.

'Inconstant'
ordered

The event proved that our naval administrators had been unnecessarily alarmed by the reports they had received of the anticipated performances of the new American corvettes. It was stated in the report of the Board of Steam Machinery Afloat in 1869, that the cost of the 'Wampanoag' was \$315,000; that she could carry only 750 tons of coal, of which 200 tons were stowed on the berth deck, and that this supply was barely enough for four days' steaming at full speed. Owing to the acute shape of these vessels not a single gun could be used on her gundeck in giving chase to an enemy ahead, and even the use of the stern guns was essentially hampered by want of room. It was stated that no wooden vessel of war of such great length and small proportionate depth, however well put together, could endure rough seas without evincing a palpable want of longitudinal rigidity. They complained also of the slowness in turning. The engines and coal represented 84 per cent. of all the weight the hull could accommodate below the water-line, and thus but 16 per cent. was left for masts, sails, cables, ordnance, and provisions. They said that 'the "Wampanoag" had undoubtedly proved very fast. For twenty-four consecutive hours her average speed was 16.95 knots, while her maximum speed was $17\frac{3}{4}$ knots; but at this extreme rate her consumption of coal was 175 tons a day; and she could only carry fuel enough to steam 950 miles. The quality of high velocity was thus about all that had been really established as to her merits as an efficient

Board of
Steam
Machinery,
1869

Failure of
'Wampanoag'

vessel of war. The weight of her battery was insignificant. Her accommodation for provisions was insufficient. Her accommodation for chain cables was also inadequate, as those on board were altogether too short for a vessel of her length to be moored with convenience. The accommodation for her crew was strikingly confined, and in warm climates, with steam up, she would have been almost uninhabitable. Looking upon her as a whole, and especially in the light of a vessel for general naval purposes, it seemed impossible to resist the conclusion that she was a signal failure, and utterly unfit to be retained in the service, and that she would therefore prove a happy riddance upon any terms that would require the value of her convertible materials.' The Americans finally decided on making considerable reductions in the engine-power of this class, and abandoned completely the intention of giving them the extraordinary speed originally contemplated. Four boilers were removed, and these vessels can now steam at the rate of 10 knots an hour. Officers, who in the excess of their zeal for the efficiency of their own service seem disposed to require that every ship built for the British Navy should be without a rival in every quality which can contribute to the efficiency of a ship of war, should carefully consider this short history of the 'Wampanoag' scare.

State of
United
States
Navy,
1870

We have seen how the House of Commons was alarmed at the threatened superiority of the American cruisers, and how they accepted without question the proposal to build the extravagant ships of the 'Inconstant' class. Let us turn once more to America, and see what were the opinions entertained by the Americans themselves as to the state of their Navy. The Board of Steam Machinery Afloat carefully reviewed the condition of

their fleet, and with a candour only to be equalled by the self-condemnation so habitual in this country, they, in their report of 1870, observed that 'it was mortifying and humiliating to witness the amount of naval trash that had been turned out, and of which the Navy, as to vessels, was to a large extent composed.'

Again, in his report of 1871 Admiral Porter said : 'Our naval vessels have in but very few instances developed high speed, 8 knots being the general average, while only a few ships have attained a speed of 12 knots. In the French and British Navies, on the other hand, 14 and 15 knots are almost invariably attained in the iron and wooden vessels built within the past four years.'

Admiral
Porter,
1871

It was a needless alarm which led to the construction of the 'Inconstant,' the 'Blonde,' and the 'Raleigh,' which, whatever their merits, were far more costly than any vessels previously designed solely for engaging small unarmoured cruisers or for destroying defenceless merchantmen. The original estimate for the 'Shah' was, in round figures, 200,000*l.* ; the estimate for the 'Raleigh' was 180,000*l.* One serious defect in the 'Raleigh' class arises from the exposed situation of the machinery and boilers. It has not been possible to place the latter as completely below the water line and under the protection of the coal bunkers as in the wooden screw frigates. The comparatively exposed position of the machinery in the new vessels is the more serious now that steam is used at the high pressure ordinarily maintained in the modern compound engines. A projectile striking the boiler when steam is carried at a pressure of not less than 60 lbs. would cause a most destructive explosion. The importance of giving to machinery as much protection as possible was illustrated in the recent action between the French cruiser the 'Bouvet' and the

Great
cost of
'Raleigh'
class

Position of
boilers

Prussian despatch boat 'Meteor' in the West Indies. Having rammed the 'Meteor,' and inflicted considerable injury on his antagonist, the captain of the 'Bouvet' was unable to follow up the advantage he had gained, because his machinery had been disabled by a shot; and he was accordingly compelled to return into port under sail.

Last programme

The most recent programme of the English Admiralty embraces three classes of unarmoured cruisers. At the head of the list, in the first class, are the 'Inconstant' and the 'Shah,' of 5,700 tons and 1,000 horse-power, and the 'Raleigh,' of 4,700 tons and 800 horse-power.

French cruisers

The French, not without regret, are slowly following us in the construction of large unarmoured ships. In 1871 the designs of M. Lebelin de Dionne were approved for the 'Duquesne,' of 5,400 tons and—as it was stated by M. Dislère—of 1,800 horse-power. This ship was to have an estimated speed of 17 knots. The vessel is now being built, though very slowly, at L'Orient. A sister ship, the 'Tourville,' has also been projected. The armament proposed for the 'Duquesne' is composed of twenty 14 c/m. guns and seven 16 c/m. guns. The latter, which are the largest guns admitted into the French unarmoured cruisers, weigh 4 tons 18.5 cwt.; their calibre is 6.48 inches; their battering-charge is 16.5 lbs.; and the service-charge 11 lbs.; the projectile for the former weighing 99 lbs., and for the latter 69.5 lbs.

Second-class cruisers

The second-class cruisers of our Navy are represented by the 'Rover' and the 'Bacchante;' and this class includes the 'Boadicea' and the 'Euryalus,' the 'Active' and the 'Volage.' The 'Bacchante' and the 'Boadicea' are ships of 3,910 tons and 700 horse-power,

their original estimated cost being 170,000*l*. The 'Euryalus' and the 'Rover' are of 3,450 tons and 700 horse-power, and their original estimated cost was 160,000*l*. The 'Active' and the 'Volage' are of 3,180 tons and 600 horse-power, their original estimated cost being 126,000*l*. The speed of this class is 15 knots.

The corresponding class in the latest programme of the French Admiralty is represented by the 'Duguay Trouin,' of 3,200 tons and 875 horse-power. The estimated speed of the French ships is 16 knots. It should, however, be stated that the estimates of speed and the reported results of actual trials in the French Navy must not be unreservedly accepted. In armament the French ships are decidedly inferior to our own. The armament of the 'Duguay Trouin' is intended to consist of one 16 c/m., or 64-pounder, and eight 14 c/m. guns, while our own ships will carry sixteen 64-pounders and two 7-inch guns. The 'Duguay Trouin' is the only vessel of the class actually in progress in the French dockyards.

For the third-class cruisers adopted by the English Admiralty we may take, as a typical vessel, the 'Magenta,' of 1,800 tons displacement and 350 horse-power. This class includes the 'Encounter,' 'Amethyst,' and 'Modeste.' These ships steam 13 knots, and have been highly approved by the officers who have commanded them.

Third-
class
cruisers

The typical vessel of the corresponding type in the French Navy is the 'Rigault de Genouilly,' the only ship of her class now in progress. This vessel is of 1,643 tons and 453 horse-power. Here, again, the French ship has an alleged advantage in point of speed, estimated by her constructors at 15 knots, while there is a considerable inferiority in the proposed armament of

eight 14 c/m. guns when compared with the fourteen 64-pounders of the 'Magicienne' class.

Coal
capacity

Both the 'Duquesne' and the 'Duguay Trouin' are to be capable of carrying coal sufficient to steam a distance of 5,000 miles at 10 knots an hour. The second class shows an inferiority in speed, and a yet more considerable inferiority in armament ; but for the services for which these ships are designed they give, in the opinion of M. Dislère, who agrees in this regard with Mr. Barnaby, a more satisfactory result than the larger ships, in proportion to the expenditure incurred.

For a
blockade
numerous
ships
essential

The experience of the war against the Confederates in America is enough to show that when a blockade is to be maintained on a long line of coast, or where the Navy is called upon to furnish ships to go in pursuit of privateers or cruisers, few perhaps in number, but roaming at large over the ocean, individual power will not compensate for insufficiency of numbers. In January 1865, there were in the United States Navy 671 ships in commission, the greater number of which were employed in blockading the coasts of the Southern States. Doubtless the blockade might have been more strictly maintained by a smaller number of more efficient ships. But as the most powerful vessel has not the property of ubiquity there must be a limit, beyond which increased power and speed cannot adequately compensate for loss of numbers.

Armament

A few observations may here be made on the subject of guns. Ever since the introduction of steam, armament has been sacrificed more and more to speed, reliance being placed on the superior calibre of the guns, as a compensation for the reduction in their number. The increase of calibre is, however, attended of necessity with many serious disadvantages. The fire is slower,

the number of guns is much reduced, perfect accuracy of aim cannot be insured; and where the number of shots is limited there is less chance of hitting an enemy, and greater loss whenever a shot fails to take effect. The policy laid down in the report of the French Commission of 1824 is as true to-day as it was fifty years ago. The power of a ship cannot be determined by the weight of metal discharged in a single broadside. It would be more correct to say that the power is directly proportionate to the weight of metal which can be fired in a given period of time. For these reasons the Commissioners condemned very heavy guns for cruisers. At the present day the unarmoured cruiser does not require guns of a sufficient calibre to penetrate armour-plating. For such a purpose 12-inch guns would be necessary; whereas, for the special work of a cruiser the 64-pounder is sufficiently powerful, and at short distances will even penetrate the armour of all but the most strongly-protected ironclads.

Disadvantages of big guns

The better opinion would therefore seem to be that entertained by Captain Waddilove. He thinks the guns of the 'Inconstant' are too heavy for the mere destruction of commerce, while the vessel is too unprotected to cope with ironclads. The authority of Mr. Childers may be cited on the same side. In moving the Navy Estimates in 1869, after adverting to the armament of 12½-ton guns which had been given to the 'Inconstant,' he proceeded to speak of the 'Active' and 'Volage.' They carried only 6½-ton guns, but that he considered as a calibre quite sufficient for all services connected with the destruction of commerce. The best armament for a cruiser should consist of two guns of heavy calibre, with as many additional guns of a calibre not exceeding 64 pounds as it may be possible to carry.

Light guns best for cruisers

In the French Navy none of the guns mounted in cruising vessels exceeds the 64-pounder. The English gun-vessels have generally carried a more powerful artillery than the French vessels of similar tonnage. This advantage is still maintained in the more recent vessels of the 'Avon' and 'Bittern' class. Gunboats of from 500 to 700 tons, powerfully armed and capable of attaining a speed of 11 knots, are well fitted for the protection of commerce, or to attack foreign cruisers or privateers like the 'Alabama.'

Interrogatories of
Captain
A. W.
Hood, R.N.

Having given a general summary of professional opinion on this subject, I can best express the conclusions at which I have arrived by quoting the two following questions, propounded by Captain Hood, with the replies of Captain Waddilove. Captain Hood asked a question No. 2,388 in the blue-book of the Committee on Naval Designs : 'Looking solely to the protection of our commerce, and seeing that the "Inconstant," of 4,066 tons, steams $16\frac{1}{2}$ knots at the measured mile, and the "Volage," of 2,300 tons, steams $15\frac{1}{4}$ knots, would it be more advisable to have a certain number of "Inconstants," or double the number of "Volages"?' He is answered by Captain Waddilove : 'Taking the question of Admiral Elliot, if you are to capture privateers of great speed, you must have something that will equal or surpass them in speed. I think that double the number of "Volages" would be a better provision for the protection of our commerce than half the number of "Inconstants."'

Captain
Waddilove,
R.N.

'Do not you think that a vessel of 2,300 tons possessing the power of steaming 15 knots has ample speed for the protection of our commerce?' To this question the answer was : 'I should think she probably has ; but if the enemy's vessel were faster than that, of course it would be insufficient.'

It is proper to add that Mr. Reed expressed a different opinion before the same Committee. He considered that the moral power of the country would be better sustained in war time by a more limited number of extremely fast ships. He thought that our commerce should be protected by vessels both of the 'Inconstant' and the 'Volage' classes, and that the 'Volage' might meet with vessels which could get away from her, and that that would have a demoralising effect. Up to the present time, however, no such vessels have been built, either for the fighting or the mercantile Navies of any foreign Power.

Mr. E. J.
Reed, M.P.

The necessity for extreme speed is a relative question. It depends upon the resources of the enemy in vessels possessing that quality, which it is always most expensive to secure. In the actual state of naval power abroad, the most serviceable vessel for the protection of commerce would seem to be a ship not exceeding in any case the dimensions of the 'Volage'; though some vessels of that class might possibly be made more efficient for service in European waters, or even in the North Atlantic, if their spars were reduced, and their steam-power and coal-carrying capacity, and perhaps their armament, were proportionately increased.

General
view of
the type
required

The Committee on Designs, while expressing their belief that the 'Inconstant' class was calculated to perform very valuable service, suggested a subdivision, the one class to possess the sail power of the 'Inconstant,' whilst the other might have increased speed, say 18 knots at the measured mile, with a considerably reduced spread of canvas and a larger supply of coal. The former class would be the more useful in distant seas, the latter would be the more valuable nearer home.

Committee
on designs
for ships of
war

In the Estimates for the present year provision has

Programme
of 1875-76

been made for building 10,359 tons weight of hull of armoured ships and 3,453 tons only of unarmoured ships. Of the latter there are of iron corvettes with covered battery 1,452 tons, of which the ships of the 'Bacchante' class represent 960 tons, and those of the 'Euryalus' type 491 tons. Of small composite corvettes of the 'Magicienne' class there are to be built 551 tons. Of composite sloops there are to be built 1,050 tons, of which the 'Cormorant' class, of four guns, 900 horsepower, and 642 tons, represents approximately one-half of the proposed tonnage. The ton weight of hull is not the same thing as a ton of displacement, but for the purpose of comparison the mode of calculation adopted in the Estimates is satisfactory.

No exception can be taken to the programme in regard to the proportions the proposed additions to the various classes of ships bear to one another. In view of the state of other Navies as to unarmoured ships, the next vessel to be laid down should be of the 'Magicienne' rather than the 'Boadicea' type.

The cost of the 'Bacchante' is, for the hull 109,200*l.* and for the engines 72,000*l.*, or a total of 181,200*l.* Hence it will be seen that we can build five ships of the 'Magicienne' type for two of the 'Bacchante' type ; and, seeing that for the protection of commerce the 'Magicienne' class are adequate in power and speed, it is good policy to build ships of the smaller rather than of the larger type, the latter being unnecessarily powerful for the work they have to do.

Our
require-
ments

We require, in greater numbers than we have them now, ships of the 'Volage' and 'Magicienne' types, or of that smaller class of 1,000 tons recommended by Admiral Porter for the United States Navy. Efforts have been made by the Admiralty in this direction ; but what

we want most of all are vessels of any special class that we should not be likely, in an emergency, to obtain from the merchant service. I would particularly urge, therefore, the construction of a greater number of torpedo vessels. The 'Vesuvius' is our first experiment in this direction. She may or may not be satisfactory. Considering that she is the pioneer of an untried class, it is presumable that defects will be discovered which can be remedied in future vessels. It is the duty of the Admiralty to proceed without delay to increase the number of these vessels, and to improve their efficiency.

The Americans have recently launched a torpedo vessel, of which the following description is given in a recent number of the 'Army and Navy Journal':

The 'Alarm' draws 10 feet forward and 10 feet aft. The length of keel is 170 feet, including the ram. The beam is 28 feet, and she carries five days' coal. Her armament consists of one 15-inch gun on the bow, to be replaced by a 20-inch smooth bore or a 12-inch rifle. She will carry four Gatling guns on each side, and as many more may be mounted as necessary to defend her from boarding parties. The guns were fired during the trip and worked excellently. Her arrangements for firing the torpedoes all go to the pilot-house, and a system of signals is used to order the different spars to be run out, and when they are out they are in the same way reported to the pilot-house as ready. Thus the whole operation of working the ship, engines, torpedoes, and battery is done by the captain in the pilot-house. The spars are twelve inches in diameter, and made of the best gun-metal. They are run in and out by steam. The side spars extend seventeen and a half feet from the side, the bow spar twenty-four feet ahead of the ram. The ram extends fifteen feet forward under water, and for eight feet is

The
'Alarm'

solid iron. The gun and bows are protected by four inches of plating. It is intended to put on three inches more, and the displacement is so calculated. The spars will stand an explosion of fifty and one hundred pounds of dynamite, being equal to several times that weight of gunpowder. Her crew will consist of five officers and sixty men.

The
'Vesuvius'

The 'Vesuvius' was built at an estimated cost of 14,000*l*. Vessels of this class may therefore be multiplied without extravagant outlay. Mr. Goschen originally proposed to build a torpedo vessel of 540 tons and 11 knots' speed, and this, he said, would not be a costly ship. Such a vessel could certainly be built for 30,000*l*. Even supposing that we went so far as to expend 40,000*l*. on her construction, this would be about the cost of the despatch boats of the 'Lively' and 'Vigilant' class we at one time built so rapidly, and which made no addition to the fighting strength of the Navy. Properly fitted for the use of the submarine torpedo, which can now be fired from the broadside with such fatal precision ; having a speed of not less than 15 knots ; and with such powers of turning as it is impossible to give to larger ships, who that reads the signs of the times can doubt that a squadron of ten torpedo steamers would be a most important addition to the Navy ?

I need not further press the argument against excessive expenditure on individual ships. I would only refer in conclusion to the report of the Committee on Designs and to their emphatic declaration that 'In every description of unarmoured ships the smallest dimensions, consistent with the attainment of the requisite speed, should be adopted.'

Our
merchant
service

Hitherto the protection of commerce has been treated as if we were entirely dependent on ships built

expressly for war. But the maritime resources of this country are not confined to the Royal Navy. Splendid and powerful as our ships may be, we must inevitably, in time of peace, be deficient in point of numbers. For the tremendous exigencies of war the fleet might be supplemented and expanded, so as to acquire undisputed ascendancy, by equipping and arming our ocean mail steamers.

The resources of our mercantile marine are highly appreciated by naval administrators even in countries where the ocean steam service has not attained to the development it has reached in this country. 'There is,' says the Secretary of the United States Navy, in his report of 1869, 'another element of defence in time of danger, perhaps as effective as any other, available to wise and liberal statesmanship. . . . Such means would be at hand if we had lines of ocean-going steamers established. There are now running from New York, Boston, and Baltimore to Europe over 60 powerful screw steamers, any of which could be quickly converted into an efficient and powerful ship of war capable of carrying full sail power and keeping the sea for any length of time. Had our mercantile marine possessed such lines at the breaking out of the late war, we might have quickly closed every Southern port. A comparatively small force of this kind, appropriately armed and let loose on the ocean, under the command of bold and intelligent officers, would be a dangerous foe to the commerce of any country. Our own ships were substantially driven from the seas by two or three roughly equipped vessels, much inferior in power to those of which I have spoken.'

Value of
merchant
auxiliaries

It is a just subject for regret that, while we stand committed to large subsidies for the postal service, the

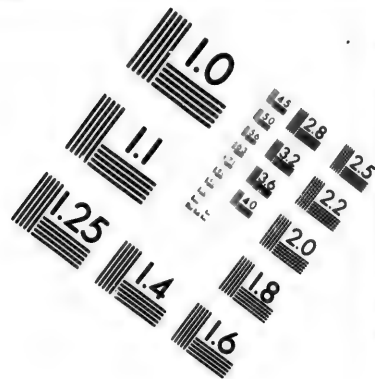
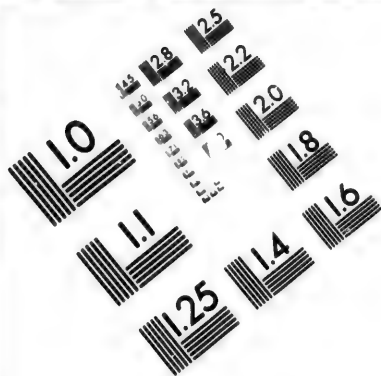
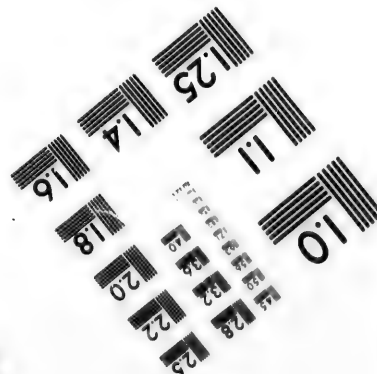
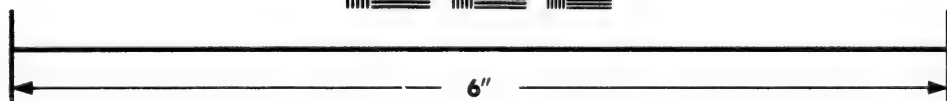
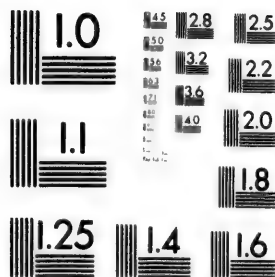


IMAGE EVALUATION TEST TARGET (MT-3)



Photographic
Sciences
Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

28
25
22
20

10

owners of these great lines of steamers are under no absolute engagement to place their ships at the disposal of the Government, in the event of war, at a certain fixed rate of charge. The Crimean war showed the enormous value of the large fleets of the ocean steam navigation companies. The subsidies granted for the conveyance of letters during peace will, provided we make proper bargains beforehand, secure for the Government an invaluable fleet of cruisers and transports in time of war.

Progress of
merchant
shipping
at home
and abroad

The following figures are taken from the tables showing the progress of merchant shipping, issued by the Board of Trade, for 1874. They prove the strength of our position in this respect by comparison with all the other naval Powers.

The aggregate tonnage of the merchant navy of the British Empire in 1874 was 7,213,000 tons; while that of the United States, excluding river steamers and home trade, was 1,410,000 tons; and that of France 1,677,000 tons.

The tonnage added to the register in 1872 was, for the United Kingdom, 471,518 tons; for the United States, 209,052 tons; and for France 87,000 tons.

The steam tonnage of the British Empire in 1872 was 1,640,639 tons; that of the United States (oversea trade) 177,666 tons; and that of France 177,432 tons. Of steamers there were built in the United Kingdom in 1872 416,000 tons.

The merchant navy of Nor . Germany in 1872 comprised a total of 5,082 ships, of 1,308,988 tons, of which 2,090, of 165,178 tons and 29,139 horse-power, were steamers.

The Russian merchant service was composed of 2,514 ships, of 259,773 tons, including 189 steamers of 13,152 horse-power.

If we were engaged in war and the resources of our shipbuilding yards were applied exclusively to the construction of fighting vessels, we should in twelve months be able to create an overwhelming fleet. At the Elswick Works 1,500 men are employed in making guns for every foreign government. In this establishment the British Government possesses another Woolwich, and all its resources would of course be entirely at the disposal of this country in the event of war.

Resources
of Elswick
Works

In marine steam machinery we stand at the head of the maritime nations. 'All the recent improvements,' said Admiral Porter, in his report of 1870, 'were made on the Clyde and the Mersey, where giant strides are taking place in the construction of machinery for war and for the merchant service.'

The magnitude of our mercantile marine may be illustrated by pointing to a few of the most important lines. The Cunard Company alone have 49 ocean-going steamships, of 90,000 tons and 15,000 horse-power, far exceeding the entire fleet of the German Empire. In Glasgow alone, Messrs. Henderson Brothers, of the Anchor Line, give employment to 30,000 persons. They build and equip their own ships. The United States have seven regularly established naval yards; but only four of these are capable of fitting out more than two or three vessels at a time; and in the seven navy yards there are but three dry docks, so that, in this most important feature, the entire resources of the United States Navy are inferior to those of Messrs. Laird Brothers.

Extent of
mercantile
marine

These facts ought to remove the faintest shadow of apprehension from the most timid and anxious minds. The mercantile marine is an essential element of naval

strength. No fighting Navy has ever been maintained without the support of a busy maritime commerce. Lord Bolingbroke has truly said : ' By trade and commerce we grow a rich and powerful people, and by their decay we grow poor and impotent. As trade and commerce enrich, so they fortify our country. The sea is our barrier, ships are our fortresses, and the mariners that trade and commerce alone can furnish are the garrisons to defend them. Like other amphibious animals, we must come occasionally on shore ; but the water is more properly our element, and on it, like them, as we find our greatest security, so we exert our greatest force.'

II

OUR IRONCLAD FLEET

SPEECH IN THE HOUSE OF COMMONS, JULY 8, 1875

MR. T. BRASSEY said the Motion he had placed on the paper embraced both armoured and unarmoured ships. While the principles he sought to enforce applied equally to either class, for the sake of brevity his observations would be confined to ironclad ships. In recommending that an effort should be made to combine the most essential qualities of a man-of-war with reduced dimensions he did not desire to criticise in an unfavourable sense the shipbuilding policy of the past. The ships designed by the hon. member for Pembroke and his successors were admitted by the most competent authorities abroad to be superior to any yet built in their own naval yards. We had been going with the times, and keeping well ahead of other nations. On the other hand, it would be admitted that the number of fighting ships we had been able to turn out had been year by year diminishing. During the last ten years we had launched on the average two ironclads annually. The former average was insufficient, and there had been a marked falling off in the last three years. In 1870 six ships were launched, including three of the 'Audacious' type, and the 'Hercules' and the 'Sultan,' which still remained the most powerful masted ironclads we possessed. In 1871 we

Falling off
in iron-
clad con-
struction

launched seven ships ; four were of the 'Cyclops' class, comparatively small, and intended only for coast defence. In 1872 we launched three ships—the 'Devastation,' the 'Thunderer,' and the 'Rupert.' The two succeeding years were a blank as regarded the history of our iron-clad shipbuilding ; and when the 'Alexandra' was recently launched at Chatham an interval of nearly three years had elapsed since an armoured ship had been added to the Navy. The cause of that stagnation was not so much the insufficiency of the Estimates as the extravagant cost of the individual ships. Previous to the iron-clad epoch a ship of war could be built for 1,000*l.* a gun ; the cost had now increased to 125,000*l.* a gun ; and those figures, large as they were, might be considerably augmented before the 'Inflexible' and the 'Dreadnought' were completed. Such an outlay was the less satisfactory at a time when questions were being raised as to the policy of building those enormous ships under the altered conditions of naval warfare.

Altered
situation
abroad

He did not insist on smaller ships with a view to reduction of expenditure. Previous to the Franco-Prussian war it might have been possible to bring down the Naval Estimates to a sum not exceeding 10,000,000*l.* The increased armaments of the Continental Powers had altered the situation. The particular amount required must be determined by the responsible Ministers of the Crown, and they need never shrink from asking for what was necessary to maintain an efficient Navy. The most rigid economists in the House of Commons had no desire to starve the Navy, though they were anxious, and rightly so, that our effective strength should be proportionate to the outlay incurred.

In the past history of the Navy there were many instances where we had been too slow in admitting the

necessity for a change in the system of naval construction. We had clung to the accepted types, because a reversal of policy would have been tantamount to an admission that the fleet which we had created at great pains and cost had become obsolete, or at least of little value. It was undoubtedly most difficult to form a distinct conception of the future requirements for the matériel of the Navy. The problem must be faced. The other maritime Powers were not dependent, like ourselves, for their very existence on the command of the seas. They could afford to wait the result of our costly experiments. We were in a different position. The question we had to decide was not whether we should, or should not, for a time suspend our shipbuilding operations, but rather what type, or types, it was most advantageous to adopt, having regard to the actual and prospective conditions of naval warfare. Were we right in building ships of monster size solely for the purpose of carrying armour, ponderous in weight, but no longer impenetrable? It was practically impossible to construct vessels to carry armour sufficiently heavy to resist the guns already introduced, still less to resist those in process of manufacture. That was proved by the table, published by the War Office, showing the penetrating power of the guns in use in 1873. The Committee on Naval Designs, in their report made in 1871, pointed out that we were approaching a period when the guns would assert a final and decided superiority over armour. Admirals Elliot and Ryder, in their separate report, expressed an opinion that the continued use of side-armour was of doubtful expediency. They objected to the use of any vertical side-armour of less than 20 inches in thickness as a protection to the vitals of a ship. They believed that if war broke out, and our fleet were

Modifica-
tions in
construction
must be
adopted

Committee
on Naval
Designs

protected by this armour, the other maritime nations would resort to the use of guns against which the armour we now employed would afford no protection. At the present moment the Elswick Company were making twelve 100-ton guns for the Italians, and the French had a 38-ton breechloading gun, which, next to our own, was the most powerful gun in any Navy. M. Dislère, the author of a most suggestive essay, recently published, 'La Marine Cuirassée,' condemned as inadequate any armour of less than 16 inches in thickness; and it had been laid down, no doubt correctly, by the hon. and gallant member for Stamford that a ship defended by 16-inch armour must have a displacement of 16,000 tons. In the opinion of M. Dislère, armour which was not impenetrable was worse than useless; for, if there was reason to hope that large shells might penetrate the thin sides of unarmoured ships without bursting, it was certain that they would burst against the weakest armour. While, however, the value of armour as a protection against guns was daily becoming more and more doubtful, it seemed probable that engagements would hereafter be fought, not with the gun, but with the ram and with the torpedo. In dissenting from the report of the Committee on Naval Designs, Admirals Elliot and Ryder expressed their firm conviction that the most destructive means of attack would be found in the ram and the torpedo; that the most efficient ram would prove the most efficient fighting ship; and that the leading features of unsinkableness and handiness, which constituted the best ram, would also facilitate the avoidance of the enemy's torpedoes. Looking to the growing importance of ram and torpedo warfare, it appeared to them most desirable to avoid building ships of such large dimensions as the modified 'Fury,' with a displacement exceeding 10,000

Admirals
Elliot
and Ryder

tons. In the United States special attention had been devoted to torpedoes. Admiral Porter, in an official report, predicted that in the next great naval fight the torpedo would decide the result. At Berlin it had been determined to build no more large ironclads at present. In France it was believed that the torpedo was destined to produce in naval tactics a revolution not less complete than those which had already been brought about by steam, rifled guns, armour-plating, and the ram. The torpedo would now, M. Dislère anticipated, be fired from the broadside of ships in action; it might, in short, be regarded as a submarine gun. During the Franco-Prussian war the French fleet in the Baltic was reduced to complete inaction by the dread of torpedoes. Sir Spencer Robinson told the Committee on Designs that he believed a total change in naval warfare was impending; that what we wanted most were neither 'Devastations' nor 'Sultans,' but a class of immensely powerful torpedo ships.

It might be asked whether the attention of the constructor's department had been sufficiently directed to torpedo vessels. We had completed one small vessel, the 'Vesuvius.' A first experiment must inevitably suggest many improvements which could be advantageously introduced in subsequent designs. Mr. Barnaby had frankly admitted that it was a question how far we durst go in putting large sums of money into single ships, remembering that every ship in existence could be penetrated by torpedoes, the large ships as easily as the small ships. Where such differences of opinion prevailed, it was difficult to arrive at a conclusion as to the most judicious practical application of the shipbuilding vote. There was, however, a general concurrence of opinion in favour of certain types. Rams were admitted

Construc-
tion of
torpedo
vessels

Power of
the ram

to be necessary, and the smaller the dimensions, having due regard to other conditions, the more formidable such a vessel must be. The power of a ram depended on speed and facility in turning—*Mobilitate viget, viresque acquirit eundo*. The steam ram should be protected by armour in vital points. It was impossible to give sufficient armour protection to a small vessel without some sacrifice of other qualities. In vessels specially designed to act as rams, it would be advisable to give up guns, and it would be unnecessary to insist on a large supply of fuel. The use of rams for harbour defence had been ably discussed by Dislère. The ram for coast defence must not, in his opinion, be diverted from its proper use. As Admiral Goldsborough had put it, 'the vessel must be the projectile, the steam-power the gun-powder.' It was to be hoped that the Admiralty might feel justified in ordering at least one ram to be built, free from the incumbrance of artillery. Three or four such vessels could be constructed for the cost of one 'Rupert.'

Armour
protection

Turning to sea-going types, the Committee on Naval Designs were unwilling to give up armour protection, even though the armour might be penetrable by the heaviest guns. 'After making every allowance for the disadvantages that attend the use of an enormous dead weight of very costly armour, we cannot,' they say, 'lose sight of the indisputable fact that in an action between an armour-clad and an unarmoured ship (assuming that they carry guns of equal power) the former has, and must have, an immense advantage in being able to penetrate the sides of her adversary at a distance at which she is herself impenetrable, and, further, in being able to use with effect those most destructive projectiles, common shells, which fall harmless from her own

armoured sides.' While it might be admitted that this argument was conclusive in favour of the retention of armour for first-class vessels of war, it should be pointed out that all the advantages of the armoured over the unarmoured ship on which the Committee chiefly insisted were already secured in the 'Audacious' class. The armour of these ships, which was 8 inches thick at the most important points, would resist the projectiles of the 9-inch gun at 200 yards, and must therefore continue to be of service until foreign vessels of war received a more powerful armament than they usually carried at the present time. As cruising ironclads for general service, the 'Audacious' class, in which, for the purposes of comparison with other classes, the 'Swiftsure' should be included, presented the best result yet attained for an equal expenditure of money. The cost of each of these vessels might be put in round figures at 250,000*l.*, and it was stated by the constructors of the Admiralty, in their special report, that they had guns capable of penetrating all but the exceptional armour of foreign Powers, and that they carried armour impenetrable to all but the exceptional guns of such Powers. They carried their guns into action at a speed closely approaching to 14 knots, and they could cruise without the use of steam. Moreover—and this, perhaps, was the most important consideration of all—this result was attained in ships of a moderate size, and the first cost of the ships and of the men required to man them was thus kept down to the lowest point. All these advantages had been still more fully realised in the 'Shannon,' now building at Pembroke. When therefore it was taken into consideration that three 'Shannons' could be built for the cost of one 'Inflexible,' or at least that five 'Shannons' could be built for the cost of two 'Inflexibles,'

'Audacious'
class

'Shannon'
and
'Inflexible'

it would appear wise to divide our expenditure more equally between the two classes. Instead of having only one 'Shannon' in progress and two 'Inflexibles,' it would be more advantageous to the Navy that we should now be constructing four 'Shannons' and only one 'Inflexible.' The policy of building any vessels of the 'Inflexible' class was open to some doubt. None were being built in the United States; only one, the 'Redoutable,' very slowly, in France. In Russia the 'Peter the Great' was gradually approaching completion, having been commenced some four or five years ago. In the present undecided state of naval opinion, and while other Powers continued to build such vessels, being in this unwilling imitators of England in a policy which their own constructors disapproved, the public might feel some uneasiness if we were to abandon altogether the construction of first-class ironclads. If the Admiralty would be firm in insisting on moderate tonnage as a *sine qua non*, we might feel confident that it would be found possible to produce most formidable vessels at a greatly reduced cost. The triumphs of the hon. member for Pembroke were won by combining greater fighting power with smaller dimensions than those adopted in the earlier ironclads. The 'Hercules' surpassed the 'Minotaur' even more in the superior facility with which she could be manœuvred than in the weight of her armour and the power of her guns. The ingenuity of our naval architects would be turned to good account in designing the most powerful ships that could be built for a sum not exceeding 100,000*l*. The true policy of naval construction had been well described by M. Gervaise, an eminent constructor of the French Navy, in these terms:

Moderate
size
desirable

M. Gervaise

'Our aim should be not simply to produce ships

more powerful and of greater speed than any others of known form and dimensions. That object may generally be attained without difficulty, simply by building a larger ship than the type you wish to surpass. The really difficult problem is to produce a ship which shall combine the required power and speed with the smallest dimensions. In other words, the merit of naval architecture consists in producing the greatest possible amount of naval force for a given sum of money.'

These were principles which could not be too strongly insisted upon, and which the British Admiralty had so often forgotten in the sacrifices they had made to the idol of popularity. In justice to our own constructors he must add that they had often expressed the same opinions. In their report on the 'Audacious' class to the Committee on Designs, they said: 'In view of the dangers to which ships, however heavily armoured and armed, and however large, are exposed from torpedoes, rams, and other submarine attacks, we consider the best ships are those of the smallest dimensions, which can engage the armour-clad frigates of other nations with a good prospect of success.' The advice thus tendered to the Admiralty should be appreciated by Parliament. The constructors showed an evident reluctance to expend the ample resources at their disposal in building sensational ships. These things were done to please the public, and public opinion on such a question rested on imperfect knowledge. The judgment of the department itself was the judgment of men of special knowledge, whose claims to our confidence rested on close and constant study of this complicated question in all its bearings. In conclusion, he would suggest one other argument against building ships of exaggerated size. Would not a captain be burdened with an almost

Dangers
from
ram and
torpedo

intolerable anxiety when he knew that his ship was one of a very limited number, and that the loss of such a ship might be a most serious blow to the Navy? In the numerous fleets of the olden time, the fate of an individual ship was a less momentous question. But if we concentrated the whole power of the Navy in a few ships such as we had lately built, we threw upon the officers in command a weight of responsibility which might check that gallant and almost reckless ardour with which the great battles of the past were fought and won.

III

IRONCLADS AND RAMS

LETTER TO THE 'TIMES,' SEPTEMBER 22, 1875

IN the last session I called the attention of the House of Commons to the shipbuilding policy of the Navy, and endeavoured to point out the grave consequences which must follow if we continued to build ships of the vast and ever-increasing dimensions of our latest ironclads.

The enormous size is rendered necessary by the thickness of the armour, and the stoutest armour will be perforated by the guns now being constructed for the naval service. The ram and the torpedo are far more formidable than the heaviest ordnance, and as superior speed and handiness—the *faculté giratoire* of the French writers—afford the only protection against these dreaded weapons, the policy of imposing on our ships of war so heavy and, in this respect, useless an incumbrance becomes the more questionable.

Increase of
dimensions

These views have been consistently supported in the columns of the 'Times,' and you are wisely inviting public attention to the subject in connection with the recent disaster in the Reserve Squadron.

It is not contended that armour should be entirely abandoned, but rather that its use should be confined to special vessels. It may be retained on coast-defence ships. On the other hand, in ships of high freeboard, intended for ocean cruising, where the surface to be

protected is of necessity considerable, it seems impracticable to apply armour of sufficient thickness to resist the fire of modern naval artillery without an extravagant increase both of cost and dimensions.

Armoured
rams

Among the special vessels for which armour protection can be retained with the greatest advantage I venture to suggest a class of ships designed to act solely as rams.

If any proof were needed, the loss of the 'Vanguard' has proved the fatal power of the steam ram. It must now be assumed that efficiency as a ram is an essential quality in all ships intended to engage an enemy in line of battle. The efficiency of a steam ram depends on its mobility; and, *cæteris paribus*, mobility will be increased as the dimensions are reduced. It is self-evident that a short ship will turn more quickly and in a smaller circle than a long ship. The probability that the ram will play a decisive part in the naval battles of the future furnishes a conclusive argument against extreme tonnage.

A steam ram of novel type has been proposed by experienced naval officers in France and the United States. Armour protection is retained in vital points. As it is impossible to give sufficient armour protection to a vessel of small size without sacrificing some defensive or offensive qualities, it is considered advisable to give up the guns. If rams were constructed on this system, the vessel, to use the appropriate comparison of Admiral Goldsborough, must be the projectile, the steam-power the gunpowder.

Admiral
Porter's
opinion

In the last report addressed to the Secretary of the United States Navy by Admiral Porter, Congress is advised not to build monster ironclads with a high freeboard protected by thick plating—a task, be it observed, which has never been attempted by the naval constructors of the American service. Admiral Porter

believes that rams and torpedo vessels are more likely to be useful in naval war, and he accordingly recommends his Government to build 30 powerful rams of great speed, and at least 50 iron torpedo boats of good speed and not less than 100 tons each. The frequent failure of submarine mines has convinced naval men in the United States that the best form of offensive torpedo is a torpedo vessel fitted with an outrigger.

A passage in the report of the American admiral reminds us that in one important particular a naval action would probably be fought in circumstances similar to those which led to the destruction of the 'Vanguard' by the 'Iron Duke.' Just as a dense fog in the Irish Channel caused a fatal collision between two friendly ships, so it will be in a naval battle. Landsmen and civilians who have been present at the naval displays at Spithead will remember how speedily the splendid spectacle was obscured from view by the comparatively insignificant explosion of a Royal salute. In a naval battle the ships will be enveloped in a cloud of impenetrable density, and it is evident, as Admiral Porter points out, that 'rams and torpedoes will have pretty much their own way then, and the more smoke there is the better it will be for them.'

Power of
the ram

It would only be by continual and rapid movement that large ships could avoid the attacks of rams and torpedo vessels, and where all depends on facility of evolution it is scarcely politic to construct ships, like the 'Indeflexible,' of 11,000 tons.

These are considerations which have been duly appreciated by the naval administrations of other countries. In recent years, Germany alone has followed in our wake in the construction of a fleet of high freeboard, masted ironclads. The Germans have 11 ships of this class and

Foreign
naval con-
struction

28 torpedo vessels. The construction of large armoured vessels is not at present being pushed forward with much vigour, and although a programme has been laid down for additional ships, we may rest assured that there will be no hesitation in modifying the plan proposed from time to time in conformity with the lessons derived from practical experience. The French constructors have designed a vessel which is to rival the 'Inflexible.' The progress hitherto made is not more rapid than that attained in the case of the 'Peter the Great.'

A survey of the proceedings of foreign constructors fails, therefore, to establish the necessity for spending large sums on monster ironclads for the English Navy. Does not an examination of the actual and prospective conditions of naval warfare point to a very different policy? Would not the ingenuity of our naval architects be most fitly exercised in the construction of swift, handy, and unsinkable rams?

Mr. Reed's
designs

Mr. Reed won for himself deserved honour by bold innovations, in which the most conspicuous merits were reduction of length, and consequent increase in weight of armour, combined with improved steering qualities. If he could devote some portion of the parliamentary recess to improving the designs of ships of war, and would once more lead the way in the development of naval architecture in the same direction in which he has already been the pioneer of his profession, he will be doing a service to the Navy for which his fellow-countrymen will be grateful.

The recent catastrophe in the Irish Channel is a striking illustration of the risk we run from concentrating our naval power on a small number of large ships. In the numerous fleets of olden times the loss of an individual ship was not an overwhelming disaster. The

case would be very different in a fleet composed of four 'Inflexibles' which had cost as much as twenty line-of-battle ships such as Lord Nelson commanded.

The most powerful ships, as the recent collision has shown, are not less vulnerable than the smallest when struck by the ram or torpedo. For naval warfare, under present conditions, distribution rather than concentration of force should be the aim of those who design our ships.

Birkenhead.

IV

WARSHIP CONSTRUCTION

LETTER TO THE 'TIMES,' DECEMBER 4, 1875

Objections
to the 'In-
constant'

IN reply to the letter you published from Sir Spencer Robinson on November 22, I ask permission to state the reason why, in my judgment, the public money was not laid out to advantage in building ships of the 'Inconstant' type. Whenever a foreign naval Power produces, or even seriously contemplates, the construction of ships, with a speed of 17 knots, for the purpose of harassing our commerce, it is the obvious duty of our own naval administration to provide a sufficient number of ships of superior or, at least, of equal speed. When, therefore, it was proposed to build for the United States Navy corvettes of the 'Wampanoag' class, the Admiralty of that day wisely determined to supply for the British Navy a new class of cruisers, which should be more than a match for their American rivals. As the latter were a complete failure, the large outlay on the 'Inconstant' proved in the event to have been unnecessary. This, however, is not an objection which can be fairly taken, for had the American ships been successful, we should have required for ourselves vessels as fast or faster than theirs. But while the naval policy which the 'Inconstant' represents will be generally approved, exception may be taken to the type proposed by the constructor's department for cruisers intended solely

for the protection of commerce. Vessels capable of steaming 17 knots an hour, assuming that such a speed was required, might have been built for less than half the cost of the 'Inconstant.' With fine lines and good proportions it is not more difficult to obtain great speed in a ship of moderate dimensions than in one of enormous size. The 'Osborne,' a vessel of only 1,500 tons, or little more than a quarter of the tonnage of the 'Inconstant,' is now the fastest in the Navy.

Nor, again, was it necessary to build a ship of 6,000 tons in order to make rapid voyages across the ocean. As an ocean steamer the 'Inconstant' will not sustain a comparison with the ships of the Cunard service, of half the tonnage. The Cunard steamers, with the same favourable conditions as to smooth water and fine weather under which the trials of Her Majesty's ships are conducted, traverse the ocean at a speed little inferior to the highest ever maintained by the 'Inconstant' when steaming continuously at sea; and they possess one conspicuous advantage, they carry enough coal to make the passage from Liverpool to New York at their utmost rate of steaming; and they arrive at their port of destination with an ample reserve of fuel for contingencies. If they were not laden with cargo their coal-supply might be proportionately increased. In the case of the 'Inconstant,' on the other hand, the fuel is exhausted in $2\frac{1}{2}$ days' steaming, at measured mile speed. It is impossible to accept such a ship as satisfactory for ocean service. True it is that at a reduced rate a longer distance can be traversed. But if the measured mile speed is never to be maintained when cruising, and is to be attempted only when in chase of an enemy actually in view, then we lose in a considerable degree those exceptional advantages for which so much has been sacrificed.

Insufficiency
of coal-
supply

Ocean
speed the
best test

It is on the broad ocean, and not in the narrow waters inside the Isle of Wight, that the efficiency of a ship for the naval service can alone be effectually tested. It has been justly observed by Admiral Jurier de la Gravière that there is much to be learnt from long voyages at extreme speeds, sustained week after week with unbroken regularity. 'When,' he says, 'I shall have seen a ship of war cross the Atlantic in company with one of our ocean-going mail steamers, I shall consider any further trial unnecessary.' The 'Inconstant' could not enter the lists with a Cunard steamer in such a contest, for, when less than a third of the distance from Liverpool to New York had been performed, she would be obliged, owing to the exhaustion of her fuel, to give up the race.

Armament

It may, perhaps, be alleged that the powerful artillery supplied to the 'Inconstant' could not have been carried in a ship of less tonnage. But here a question might be raised as to whether such an armament is, in all respects, the most suitable. It has not been thought expedient to arm the 'Raleigh,' a later example of the same class, with armour-piercing guns; and if it were deemed desirable that such ships should carry heavy guns, it does not follow that all should be of the heaviest calibre. The French officers give a decided preference to the plan of a mixed armament; and for a mixed armament, including two or more powerful guns, more moderate dimensions would have been sufficient.

Moderate
dimensions
desirable

It is not necessary to carry further the discussion on the defects of the 'Inconstant.' Mr. Barnaby has shown, in the papers he has prepared for the Institution of Naval Architects, his clear appreciation of the expediency of observing reasonable limitations of size. The mistake to which your attention has been directed

arose out of the attempt to combine too many nautical and fighting qualities in the same ship. The efforts of our constructors ought to have been directed to the single aim of producing a ship efficient for the primary object of giving protection to our shipping. In that case, they would have built a ship of smaller dimensions, capable of steaming upon occasions 17 knots, and with adequate stowage for fuel. Such a vessel would have been essentially a steamer. She would have been lightly sparred, and would have carried a mixed armament, chiefly of moderate calibre, yet including two or more armour-piercing guns. The extravagance of size and cost became unavoidable when it was attempted to build a ship which should both possess extraordinary speed under steam and sail as fast as the swiftest frigates of former days, and which should not only be a more than equal match for cruisers of the 'Alabama' class, but should be enabled, by means of a formidable artillery, to cope even with an ironclad, without very serious risks to herself.

To use a homely phrase, it is not wise to 'put all our eggs into one basket.' This is a sound maxim, even in the case of an ironclad of the 'Inflexible' type, which, by means of armour, is secure, so we hope, at least from the peril of shells bursting on board. The maxim is still more applicable when we come to deal with a class of vessels which are exposed to destruction, not only from the ram and the torpedo, but also from projectiles of every description.

There is an additional source of danger in the late unarmoured ships to which our older vessels were not exposed. In the wooden screw frigates and line-of-battle ships of earlier construction, the steam was used at a comparatively low pressure, and the boilers were so placed as to be beyond the reach of a direct hitting shot.

Dangers
from shell,
ram, and
torpedo

In the more recent ships the steam is used at a higher pressure. The boilers are more exposed ; the risk of injury from explosion in the engine-room is more serious.

Types of
cruisers
required

All these are reasons for insisting on limiting the tonnage of unarmoured ships of war. Our aim should be to build for a given sum of money as many ships as we can, efficient for their several purposes. For constant cruising in remoter seas we shall require a greater area of sail, and we must be content with lower speed under steam. For service in the Channel, in the Mediterranean, and on the western coasts of Europe—where, if anywhere, it is probable that the decisive battles of the future, as in the past, may be fought—the naval constructors may dispense with sail, and concentrate their ingenuity on the development of the most formidable powers of attack, in some ships with the ram, in others with the heaviest guns.

Sir Spencer Robinson seems to view with contempt the suggestion that a speed of 13 knots would be sufficient in the greater number of vessels, though not for all, built for the protection of commerce. The sufficiency of a speed limited as proposed is, however, confirmed by the opinions of M. Dislère, of the French Admiralty ; by Admiral Porter, of the United States Navy ; and by many able officers, high in rank and of wide experience, in our own service. In the event of war, our commerce would probably be exposed to attack from a number of merchant steamers converted into privateers, few of which could exceed a speed of 11 knots. If our own cruisers could steam at 13 knots, they would be able to capture the enemy's vessels, and, provided that the speed be adequate, an increase of numbers is more important than an increase of speed.

Limit to
expendi-
ture

Naval officers and constructors are apt to argue as if the sum of money at their disposal were an unlimited

quantity. This, however, is not the case. In all countries wisely governed, and most certainly in countries governed by popular assemblies responsible to electors who, except under the temporary pressure of foreign complications, are more or less affected by an ignorant impatience of taxation, naval administrators must proceed on the assumption that there is a final limit to expenditure. In our own country the public are doubtless less anxious for economy than for efficiency in naval administration ; but the very abundance of his resources should impress a British minister with a deeper sense of the national importance of the Navy and of his personal responsibility for the effective employment of the ample means at his disposal.

The sum of 100,000*l.* was named somewhat at a venture in a former letter as the limit of cost for designs, to be submitted by the private constructors to a Royal Commission. I have since been informed that a ship of war is being built at the Thames Ironworks for the Portuguese Government, at a cost of 110,000*l.* She is 200 ft. long by 40 ft. beam. The engines are of 450 horsepower, and it is believed that a speed of 13 knots will be attained. The armour has a thickness of nine inches at the water-line, and of ten inches on the fore part of the battery. The bow is fitted as a powerful ram. Two 18-ton guns are mounted under a deck covered with 2½ in. armour, in a fixed battery forward. While it is intended that the ship shall be taken into action with an enemy in the end-on position, a stern gun of 6½ tons is fitted under the poop, though not protected by armour. In these days of rams and torpedoes many officers would, I think, prefer to have five such ships under their command rather than one 'Inflexible,' and the cost of building would be precisely the same.

Portuguese
ironclad

Sir
Spencer
Robinson

It is with regret that I find myself engaged in criticising in any particular the shipbuilding policy of an ex-Controller to whom we are indebted for a fleet of ships of matchless individual power. For many years Sir Spencer Robinson worked indefatigably and most ably at the Admiralty, and it is a hard measure of justice that he should have been called on to retire from the service as if he had been an idle man, and had not rendered the signal services which all acknowledge to his profession and to his country.

Mr. Reed's
designs

Mr. Reed having interposed—and he is most justly entitled to a hearing in any discussion on shipbuilding—I am happy to find that we are in accord on all the main points at issue. Mr. Reed is justified in claiming great credit for his designs for the 'Sultan,' and still more for those for the 'Hercules,' and it is satisfactory to know that his own high estimation of these ships—which might perhaps have been influenced by partiality—has been confirmed in the fullest sense by Admiral Porter, in his reports to the Secretary of the United States Navy, and by the numerous imitations of the English types which have been constructed for the German Navy. Nor will any be found to differ from Mr. Reed when he condemns a cheeseparing policy in naval construction. The essential point is that the large amount we spend on our Navy should be judiciously applied; and, for my own part, I am convinced that it is a grievous error in our shipbuilding policy to allow 500,000*l.*—and we are threatened with a still larger demand—to be expended on a single ship, which is only imperfectly protected from projectiles, and which is as liable as the weakest vessel of the fleet to destruction by rams or torpedoes, and which can claim no exemption, as recent experience proves, from all the other

various accidents of the seas, whether from wreck, collision, or defective machinery.

Mr. Reed says that we must have high speeds and the most powerful artillery in order to sustain the reputation of the British flag. It is not necessary that all the elements which go to make a powerful Navy should be combined in a single ship. Once admit the necessity of reducing the cost of individual ships, and the varied qualities on which Mr. Reed most properly insists must be obtained by a judicious subdivision and classification of the fleet. Each type will be excellent in its own class and specially adapted to a particular service. Here, again, I am a follower of Mr. Reed, for he, too, says that the aim should be to attain 'the highest speeds in some vessels, and the most perfect offensive and defensive powers in others.'

Subdivision
of power

This extreme costliness has always constituted an objection to the larger ironclads, and the objection has acquired a greater force now that naval officers, and especially those at the head of foreign navies, have adopted the ram and the torpedo as their principal weapons. Our judgment in these matters must be swayed by the progress of events, and when the result of the collision between the 'Vanguard' and the 'Iron Duke' is compared with the former untoward experiment of the 'Amazon' and the 'Osprey,' it is natural that a higher estimate should be formed of the power of the ram. Steering and steaming qualities will henceforward be esteemed of more importance—at least, in vessels designed to act as rams—than the thickness of the armour or the calibre of guns.

Costliness
of large
ironclads

As I shall not venture to address you again on the subject of naval construction, I ask leave to append a few observations on the recent disasters in the Navy.

Accidents
due to
defective
training

While their frequent recurrence must be a subject of the deepest regret, it is scarcely fair to make them the occasion for a party attack on the present First Lord of the Admiralty, who, as everybody knows, is not personally responsible for the navigation of Her Majesty's ships. These accidents must be attributed, not to the political Chief of the Navy, but to a defective system of training. In the theory of their profession, and in all that can be learnt in college or in harbour, our officers are probably more highly instructed at the present day than in any former period of our naval history. Drill and theory will not make an officer perfect in a profession which can only be mastered by practice at sea. When Lord Nelson landed at Gibraltar in June 1805, he made the following record in his diary: 'I went on shore to-day, for the first time since June 16, 1803, and from having my foot out of the "Victory" two years wanting ten days.' It was by their constant practice at sea, stimulated no doubt by the perpetual anticipation of battle, that the illustrious officers of the great era in our Navy became such incomparable seamen.

Cruising
under sail
desirable

Ironclads are bad schools for young officers. They cannot be handled without steam; and to keep them constantly at sea under steam would involve a large consumption of coal. Hence it follows that these ships are mostly in harbour. The lieutenants of the first reserve ships have rarely an opportunity of taking charge of a watch at sea between sunset and sunrise. Even in the Channel Squadron long detentions for heavy repairs leave too little time available for instructing young officers in their duties at sea. The difficulty is even more serious in the case of the numerous lieutenants and sub-lieutenants detained in harbour-ships for months, waiting their turn for appointments to a sea-going ship

We have some fine wooden ships in commission in the home ports. The 'Duncan,' the 'Revenge,' and the 'Aurora' can cruise under sail, and if they were more frequently at sea would be well adapted for training young officers. They are now almost always at anchor, and their officers can add little to their experience as seamen. The Admiralty are doubtless anxious to avoid unnecessary expense, but ropes and canvas should not be stinted in the instruction of officers whom we are bringing forward for the command of ships which cost 600,000*l*.

Having ventured on an opinion as to the weak point in our system of training, I suggest as a remedy that we should introduce on the home station the plan which has been adopted with so much advantage in the Mediterranean. A sailing tender of the cruiser class should be attached to each of the receiving ships, and a brig to each ironclad in the reserve squadron. If these vessels were sent constantly to cruise along our coasts the officers would acquire the experience which is so essentially necessary both in watch keeping and in pilotage. The vessels proposed would be obtained more cheaply from the private than the public yards. A sailing brig or bark of the highest class could be built for 20*l*. a ton. *Fiat experimentum in corpore vili*. Vessels of a comparatively trifling value are better adapted than our costly ironclads for the first essays of a sub-lieutenant.

Sailing
tenders

Liverpool, December 1, 1875.

V

ON UNARMoured VESSELS

PAPER READ AT THE INSTITUTION OF NAVAL ARCHITECTS,
APRIL 6, 1876

It is as a member of Parliament, deeply interested in the Navy, and not as a naval architect, that I have been invited to read a paper before this Institute ; and it is from an administrative and not from a constructor's point of view that I shall endeavour to treat my subject. I shall accordingly break ground by laying down certain axioms, which, however familiar they may be, cannot be too constantly present to the minds of those who have to control or criticise the management of the Navy.

General
policy of
construc-
tion

There must be a limit to expenditure. Even when the nation may be anxious to vote lavish sums for the Navy, a wise statesman will deem it to be his duty to keep in check the impulses of patriotism ; for he knows full well that a prodigal outlay on our part will probably arouse the jealousy of foreign Powers, and lead to a proportionate expenditure on their own armaments.

The expenditure on naval construction should be devoted mainly to ships intended for the line-of-battle. The type will vary with the progress and the modifications of naval warfare. We are not prepared as yet to throw off armour from our first-class vessels of war. Unprotected vessels are of subordinate importance. They are required for the police of the seas ; but the Admiralty

should not build a greater number of vessels of this class than are absolutely necessary in order to meet the demands of the Foreign Office for protection to British interests abroad, and to furnish reliefs for ships coming home from foreign stations. Further than this we need not go in this type of construction.

Before entering upon the special subject before me, I should like to advert briefly to another question of the highest importance, not, perhaps, suited for full discussion on this occasion, but which has a direct bearing on our policy in relation to the construction of unarmoured vessels. By the Treaty of Paris, England and France have entered into a solemn contract with the maritime world to respect private property, ~~not~~ being contraband of war, if carried in ships bearing the neutral flag. Is it to our interest to seek to abrogate the treaty into which we have entered? Our maritime trade being infinitely more extensive than that of any other nation, the area of vulnerability which we expose to attack is infinitely larger than theirs. On the other hand, our superiority in actual preparation for war to any probable, I might almost say possible, combination of nations against us is incontestable; while our unrivalled resources for the construction of the most powerful ships would give us the means of adding to our existing fleet with a rapidity which could not be equalled abroad. If, therefore, any future naval contest in which we may be involved is confined to the fighting ships on either side, and to naval operations directed against fortified places, we shall be the greatest gainers by the adoption of the new rule of international law. If these anticipations are correct, the necessity for the construction of the costly ships of the 'Bacchante' type disappears, and we can devote to the building of fighting ships the money we have hitherto

The Treaty
of Paris

Effect
on our
commerce

expended on unarmoured vessels. The large amount of that expenditure is the least satisfactory feature in our Naval Estimates.

Cruisers
for peace
duties

These considerations point to the policy of maintaining the smallest possible unarmoured Navy, consistently with its efficiency for the police of the seas. For the training of seamen ; for the purpose of exhibiting the British flag in foreign parts, and especially in the harbours of semi-barbarous Powers, who can scarcely realise the existence of a force unless it is visibly present to their gaze ; for the repression of piracy and slavery ; and for the punishment of offending savage tribes—we want, not ‘Inconstants’ or ‘Opals,’ but the infinitely cheaper little vessels of the ‘Mallard’ class. It is further to be observed that we possess, in the overwhelming superiority of our merchant navy in powerful ocean steamers, resources practically inexhaustible for the equipment of a fleet of unarmoured cruisers. This is another reason against a larger expenditure on unarmoured ships than the public service for the time being absolutely requires. The programme of shipbuilding proposed for the financial year 1876-77 seems wisely conceived with reference to all these various considerations. At the close of the session, the following return (see Table, p. 301) was last presented to Parliament, giving a list of the vessels building or ordered to be built in the year 1875.

Vessels
building
or ordered
in 1875

Further details with reference to the armoured and unarmoured classes are contained in a parliamentary paper of the present session, from which it appears that, of the ironclads, 8,037 tons are to be built in the dockyards, and 3,356 tons by contract ; and that, of the unarmoured vessels, 5,460 tons are to be built in the dockyards, and 6,909 tons by contract.

There will thus be added to the Navy, in 1876-77,

23,762 tons, of which 11,393 tons will be armoured, and 12,369 tons unarmoured vessels. While there is no great difference in the tonnage of the armoured and unarmoured ships to be built for the year, it is unnecessary to remind a professional audience that the number of tons affords no indication of the relative amounts to be expended on the two classes. The armoured ships will of course absorb a far larger sum than the unarmoured vessels.

Number to be built	Type	Guns	Displacement	Horse-power	Cost	
					Engines	Hull
					£	£
1	Shah . .	26	5,700	{ 1,000 nominal } { 7,500 indicated }	55,000	173,000
3	Bacchante . .	16	4,000	5,250	70,000	140,000
1	Rover . .	18	3,494	4,750	64,000	27,000
2	Sapphire . .	14	1,890	{ 350 nominal } { 2,100 indicated }	25,550	49,000
6	Opal . .	12	1,864	2,100	27,000	57,000
5	Cormorant . .	6	1,124	900	12,000	37,000
3	Daring . .	4	894	{ 120 nominal } { 720 indicated }	10,000	26,000
2	Arab . .	3	620	{ 95 nominal } { 570 indicated }	10,000	30,000
1	Pioneer . .	6	499	{ 80 nominal } { 480 indicated }	9,400	11,500
6	Mallard . .	4	440	{ 60 nominal } { 560 indicated }	5,000	12,000
4	Gadfly . .	1	254	{ 28 nominal } { 168 indicated }	—	6,500
2	Iris . .	10	3,693	7,000	—	10,000
2	Torpedo boats	—	141	350	6,751	10,000
2	Tugs . .	—	500	860	15,900	10,000

I observe with satisfaction that the programme of the Admiralty includes no ship so large as the 'Inconstant.' The designers of that vessel were betrayed into an exaggeration of size, from over-anxiety to combine in a single ship every quality with which an unarmoured vessel can possibly be endowed. The 'Inconstant' was to possess unrivalled speed both under sail and under steam, and was to be armed with such a powerful battery of

Defect
of 'In-
constant'

armour-piercing guns, that it was hoped that an engagement might be fought, even against an armoured ship, with some prospect of success. The attempt was ambitious, and not altogether unsuccessful; but the 'Inconstant' must be admitted to be too costly a ship for the mere protection of commerce. 'A perfect ship of war,' as it was very prudently observed by the Admiralty Committee on Designs, 'is a desideratum which has never yet been attained, and is now further than ever removed from our reach.' Any near approach to perfection in the one direction inevitably brings with it disadvantages in the other. In the case of the 'Inconstant,' the cost was such as to make it impossible to multiply vessels of her type in sufficient numbers for the protection of the great commerce which is carried on in every sea under the British flag.

Euryalus,
Boadicea,
Bacchante

The latest programme of the Admiralty shows that these considerations have been duly appreciated. The largest vessels now being constructed are the 'Euryalus,' the 'Boadicea,' and the 'Bacchante,' of 16 guns, 3,932 tons displacement, 700 nominal or 5,250 indicated horsepower, and costing in round figures 200,000*l*. The cost of this class shows a small reduction upon the price of the 'Inconstant'; and the vessels of more recent design exhibit a still more marked recognition on the part of the Admiralty of the necessity of keeping the cost and dimensions of unarmoured ships within reasonable limits. The measured mile speed of the vessels of the 'Opal' class is estimated at 13 knots. They are armed with 64-pounder guns, and can carry coal enough to steam 2,680 miles at 10 knots, or 4,050 miles at 8 knots. The French ships of the 'Infernet' type of 1,890 tons displacement, as compared with the 1,864 tons of the 'Opal,' can steam, it is said, 4,000 miles at 10 knots.

Opal'
class

Vast tonnage is not necessary in order to obtain high speed. The experience gained in the unfortunate example of the 'Great Eastern' is conclusive on this point. Within certain limits, there is considerable economy in increasing the length of ships constructed to carry cargoes. The same considerations do not apply in the case of ships of war. Cruisers for the protection of commerce would rarely be required to exert the full power of their engines, except in action, or in pursuit of an enemy. They would traverse the ocean and keep their station under sail, or, if under steam, they would proceed at the most economical rate of speed. By increasing the dimensions, a better result may be obtained for mercantile purposes with a given consumption of fuel. Economy of fuel is less important in a vessel of war, and multiplication of numbers is an important element of strength and efficiency. Recent experiments by Mr. Froude tend to prove that the dimensions of ships may be considerably reduced without loss of speed, and justify the view expressed by the Committee on Designs, that in every description of unarmoured vessel the smallest dimensions consistently with the attainment of the required speed should be adopted.

Large size
unneces-
sary

For European waters a large spread of canvas is not required. Hence a subdivision of the unarmoured class, as proposed by the committee, would appear advisable, the one class being furnished with a considerable spread of canvas, while the other might be lightly sparred, and have sufficient engine-power to attain a speed of 18 knots at the measured mile. The design for the 'Opal' class seems to accord satisfactorily with the suggestions of the committee for vessels intended to cruise principally under sail. The new despatch vessels, the 'Iris' and the 'Mercury,' now being constructed at

Cruisers for
European
waters

'Iris' and
'Mercury'

Pembroke, would seem to be a satisfactory class of swift and lightly sparred vessels for the protection of commerce. They have a displacement of 3,693 tons, and are to be propelled by engines of 7,000 indicated horsepower. They will steam at the rate of $17\frac{1}{2}$ knots, or 20 statute miles, an hour, while their coal-carrying capacity will be sufficient to enable them to steam 6,200 miles at the rate of 10 knots, and 8,600 miles at 8 knots an hour. In the French vessels of the corresponding class, it is proposed that the coal-supply should be sufficient for steaming 5,000 knots at a 10-knot speed. Until a recent period the limited supply of coal constituted the most serious defect of the English vessels.

'Coquette'
class

It has already been pointed out that the small unarmoured vessels are growing more and more into favour with the Admiralty. The 'Coquette' class has been highly approved in America. They draw 10 feet, are 125 feet in length, and are of composite construction. Their coal-supply is sufficient for a voyage of 1,440 miles at 8 knots an hour.

Having now completed the enumeration of the unarmoured vessels in actual progress for the fleet, it appears to me that the policy of the Admiralty in regard to shipbuilding has been devised by wise counsellors—men of rare experience, whether as sea-officers or as naval architects—of whose talents the country has just reason to feel proud, and whose proposals deserve the support and the confidence of Parliament. The amount of expenditure proposed for the Navy must at all times afford, more or less, occasion for debate; and the subject will undoubtedly be discussed with anxiety in the House of Commons. As to the types—and this is what we have chiefly to consider at the Institution of Naval Architects—I venture to affirm that the recent course of the Admiralty merits our approval.

VI

MOTION ON SHIPBUILDING

SPEECH IN THE HOUSE OF COMMONS, MONDAY, MAY 8, 1876,
IN MOVING FOR A ROYAL COMMISSION

MR. T. BRASSEY, in rising to move the following resolution—‘That this House, while approving the programme of work on ironclad ships for the ensuing financial year, is of opinion that the present is a fitting opportunity for reviewing our shipbuilding policy and the resources of the mercantile marine for naval purposes ; and this House is further of opinion that this inquiry should be held by a Royal Commission’—said : The resolution I am about to move is drawn in terms which cannot be regarded as unfriendly to the Government. I regret the large expenditure on unarmoured ships which the right hon. gentleman the First Lord of the Admiralty has hitherto refused to recognise as forming part of the effective strength of the Navy, but I am not aware that the designs for the ironclads now in construction have been disapproved by any competent critics. Having disclaimed any intention to criticise the ships at present being constructed, still less am I disposed to speak unfavourably of the designs approved by the late Government. Turning from the past and present to the future, I may remind the House that it was stated by the First Lord of the Admiralty, in his speech on moving the Navy Estimates, that it

Terms of
motion.

The Admiralty no
leisure
for new
problems

had been decided not to lay down any new ironclads during the ensuing financial year. I do not accuse the Admiralty of unnecessary hesitation in coming to a decision on the infinitely vexed question of naval construction ; but, if no new ships are to be laid down, it cannot be urged that our shipbuilding will be delayed by further inquiry. It may be said, however, that the department is at least as competent an authority on shipbuilding questions as any Royal Commission that could be appointed. I gladly acknowledge that the present Naval Lords, if they were not in office, would constitute a most able commission. But my fear is that they have no leisure to investigate new problems of armament, tactics, and construction. The hon. gentleman the member for the Tower Hamlets (Mr. Samuda), in seconding a similar Motion by the hon. member for Lincoln (Mr. Seely), in 1868, said, as I think, truly, that—‘When a great policy had been inaugurated, he could well understand that a department of the State might efficiently carry it out ; but it was unlikely that such a policy could be initiated by a Government department.’ [3 *Hansard*, xciii. 1118.] In the same debate the right hon. gentleman the member for Pontefract (Mr. Childers) said—‘That he could at the same time have wished that the noble Lord (Lord Henry Lennox) had been able to lay before the House some plan which, without diminishing the responsibility of the Constructive Department of the Admiralty, or diminishing its responsibility for all that was done under its superintendence, would give it the advantage of a certain amount of scientific investigation and advice.’ [*Ibid.* 1139.]

Side armour for
ironclads

The controversy as to the continued use of side armour must naturally arouse the greatest anxiety in

the country. It is said that unless armour be strong enough to keep out shells, it is worse than useless ; and armour, more or less impenetrable, even when limited to vital places, involves a large addition to the cost, and an increase of dimensions, tending to diminish that mobility, which is of the first importance, if, as Admiral Jurien de la Gravière predicts, ships will fight in the future with the rams alone. In our Navy there is an almost hopeless conflict of opinion. Captain Noel insists that excessive top-weight should be avoided. On the other hand, I am assured, in an able letter from an admiral in a high command, that our men would have no chance if they had to contend with heavy guns, protected by a turret, and therefore fired with confidence and precision. The painful uncertainty in which we are placed in this country is shared by every maritime Power. In Russia, attention is being directed chiefly to the circular ironclads, the 'Popoffkas,' which are intended solely for coast defence. In Germany, it has been decided to lay down no more ironclads at present. M. Dislère, one of the constructors of the French Navy, says that the progress made by artillery has rendered it useless to retain armour for ocean-going cruisers. While, however, we find an eminent French authority announcing that armour will shortly be laid aside, in his annual report, published last December, Admiral Porter says that the aim of the United States should be in making changes to resist the shot from the 12-inch 35-ton, which at 200 yards perforates 15 inches of solid wrought iron. He asks for 24 first-class ships ; but such vessels will represent, in his opinion, no decided power for offence or defence, unless they carry sufficient thickness of armour to resist the average rifled gun, and have speed to get within striking distance of the enemy.

Foreign
opinion
and policy

Wooden vessels add nothing to the fighting force, just as, in former days, engagements fought with frigates never materially affected the result of a war. For fighting purposes, he prefers a turreted vessel to any other.

Progress
of the
torpedo
as a weapon

I do not pretend to offer an opinion of my own. When, however, we observe such a wide difference of view, it is our duty, as representatives of the taxpayers, to take care that these subjects are thoroughly investigated before we commit ourselves to large ships, which may be condemned as obsolete before they are completed. Since this subject was last reviewed by the Admiralty Committee on Designs, great progress has been made in perfecting offensive torpedoes. Many authorities declare that the most effectual defence against the torpedo is to be found in further developments of the cellular system of construction. According to Mr. Barnaby, on the other hand, it is idle to attempt to form the bottom of a ship strong enough to resist a fair blow from a powerful torpedo. Each costly ironclad should be defended against the torpedo and the ram by a number of small unarmoured vessels. But how are you to keep such a flotilla together? If, however, our great ironclads are to be attended by a cloud of skirmishers, they cannot venture far from their base of operations. Great coal-carrying capacity will no longer be necessary, and the high freeboard and other features of a sea-going ship may be materially reduced. The Motion I originally placed on the paper contained a recommendation that designs for various types of fighting vessels should be invited from private shipbuilders. The hon. gentleman the member for Pembroke (Mr. E. J. Reed) has recently constructed for the Chilian Navy two vessels, each of 2,000 tons, armed with six 12-ton guns, protected by armour of 8 and 9 inches. Messrs. Rennie have built

Designs
outside the
Admiralty

two gunboats for the Peruvian Government, little larger than the gunboats of our 'Staunch' type, but carrying 26-ton instead of 18-ton guns. Mr. Mackrow has recently designed the 'Vasco de Gama' for the Portuguese Government, which vessel carries two 18-ton guns, protected by a circular breastwork, armoured with 10-inch armour. The ship carries in addition one 6½-ton gun and two 40-pounders, and has, I believe, been built for 100,000/. These examples suggest the expediency of following the precedent of 1867, when six of our most eminent firms were invited to submit competitive designs. Having regard to the danger to which the most powerful ships are exposed when attacked by the ram or torpedo, I should like to fix the limit of cost at 150,000/., or even 100,000/. A perfect ship could not be built for such a sum ; but the attempt to unite in a single vessel every quality can only end in an unsatisfactory compromise. On a former occasion, when a similar competition took place, Sir Spencer Robinson and the hon. gentleman the member for Pembroke were called upon to decide between the respective merits of the various proposals. The anomaly of this position was pointed out by Sir Spencer Robinson.

I have thus far confined my allusions to the fighting Navy, but the naval resources of this country are not limited to the fleet especially constructed for war. The latest returns show that, in our mercantile marine, we have 419 steamers of 1,200 tons register, and upwards. The extraordinary regularity of the passages made between Queenstown and New York is sufficient evidence of the steaming and coal-carrying capabilities of these ships, and the torpedo provides the means of defending them against the most powerful vessels of war. It therefore makes them a source of great naval strength.

Vessels
built by
private
firms for
foreign
govern-
ments

Steamers
of the
mercantile
marine as
cruisers

Proposed
commission
of inquiry

The owners of ocean-going steamers should be encouraged by judicious subsidies to build their ships of such a type that they could be converted, if necessary, into armed cruisers. This object can only be attained by making arrangements beforehand when the designs are being prepared. Numerous precedents might be cited of independent inquiry by commissions and committees into the condition of the Navy. It may not be equally widely known that a commission, precisely similar to that which I propose, has recently been authorised by the United States House of Representatives. This commission is to consider the great changes which have taken place of late years in naval warfare, and to recommend the best type of ship to meet these changes. They are to report on the whole subject, and to enable Congress to consider intelligently, and to legislate upon, naval affairs in all their branches. The last is precisely the object I have in view. Under our parliamentary system, it is essential that every department of the Government should carry with it the approval of the public, even in matters of administrative detail. There is no alternative, therefore, for the Admiralty but to satisfy the country that the expenditure they propose is unnecessary, that their designs for ships are well considered, and that everything that it is practicable to do is being done to make the great resources of the country available as a reserve for the Navy, and so to diminish, as far as may be, the cost of our standing force in time of peace. The report of the proposed commission should be an invaluable document in the hands of the First Lord in pleading with Parliament on behalf of the Navy. It will not be necessary to make disclosures on points of detail. In Parliament we want only that general information which will enable us to determine whether or

not armour should be retained. We want advice as to the relative value of armoured and unarmoured ships and as to the necessity or otherwise of building unarmoured ships of the vast dimensions of the 'Inconstant' or the 'Raleigh.' Thus far I have referred to the different modes in which money may be spent to strengthen the Navy. May we not venture, however, to hope that the commission might be able to suggest economies in other directions? I noticed only the other day that 23,000% had been spent in repairing the 'Salamis.' Can it be supposed that any private ship-owner would have allowed such a sum as I have named to be spent in repairing a despatch boat of 835 tons? Admiral Porter has suggested in his last report that iron cruisers should be built for the United States Navy, and kept on the stocks until the outbreak of a war. In this way all waste from wear and tear and dry-rot would be avoided. Might not we do the same thing with advantage? In conclusion, assuming that such an inquiry as I have suggested were to be ordered, the question is whether it should be conducted by a committee or a commission. A commission is to be preferred as being more independent. It may be that the report would be wholly in favour of the designs submitted by the Admiralty. If such were the result, it would be eminently gratifying, both to the constructor's department and to the public. If, on the other hand, the result should be that some suggestions were obtained which had not hitherto been adopted by the Admiralty, that again would be valuable as tending to make our Navy stronger and more efficient than before.

Commission
better than
a committee

VII

RECENT DESIGNS FOR SHIPS OF WAR

REPRINTED FROM 'MACMILLAN'S MAGAZINE,' AUGUST 1877,
BY PERMISSION OF MESSRS. MACMILLAN

AN opinion may perhaps be entertained in many quarters that professional critics are alone competent to discuss the shipbuilding policy of the Navy. A distinction should, however, be drawn between questions of constructive detail and questions of general policy. In regard to the former, experts alone can express a competent opinion; on the general question, common sense is no untrustworthy guide. The perplexity of the subject is increased by the unfortunate circumstance that the opinions of the experts themselves are often diametrically opposed; and, as the controversies that are raised are of the gravest national importance, it becomes necessary for the public to form for themselves an independent conclusion.

Divergent
views on
naval
matters

I take as an illustration the discussions on the expediency of retaining armour, and the relative power of the gun, the ram, and the torpedo. In the British Navy there is an almost hopeless conflict of opinion. Captain Noel, the author of an essay to which the prize of the United Service Institution was recently awarded by three distinguished admirals, dwells on the importance of avoiding excessive top-weight, and so securing a sufficient margin of stability to enable an ironclad to

continue seaworthy, even though partially waterlogged from injuries received in action. He considers this point so important, that he recommends the abandonment of armour for the protection of the battery. An opposite view is that our men would have no chance in an unarmoured ship if they had to contend against heavy guns, protected by a turret, and therefore fired with confidence and precision.

The painful uncertainty in which we are placed in this country is, however, shared by every maritime Power. Impressed with a conviction of the impracticability of resisting the fire of the heavy guns recently introduced, many naval authorities have advocated the abandonment of armour as a useless and costly encumbrance. In his able work, '*La Marine Cuirassée*,' published in 1873, M. Dislère, of the constructor's department of the French Navy, said, 'The armoured sea-going cruiser is in our judgment an obsolete type.' The predictions of M. Dislère are almost justified by the course of events in naval construction. The '*Inflexible*' is protected by 18-inch armour, and the Italian ironclad, the '*Dandolo*,' by 22-inch armour. When the progress of gunnery shall have rendered 22-inch armour insufficient, Messrs. Cammell undertake to roll plates of 30 or even 40 inches. 'For the moment,' as it was observed in an article on these vessels in the '*Times*,' 'the advantage seems to be in favour of armour; and yet a target, representing the strongest portion of the armour of the "*Inflexible*," was penetrated at 1,800 mètres by a Krupp gun.'

Uncertainty
abroad

In his essay, published in the present year, entitled '*La Guerre d'Escadre*,' M. Dislère somewhat modifies the opinion he had previously expressed. He says, 'The aim has been, with the mastless ironclads, to produce

Views of
M. Dislère

a ship of war unsinkable by the fire of the enemy, and capable of fighting its guns to the last. Everything has been sacrificed to that idea. Due regard has not been paid to the effect of the new weapons, the terrible effect of which was revealed during the American War of Secession, and at the battle of Lissa. Against the ram, and against the torpedo, the Colossus of the seas, of from ten to eleven thousand tons, loses the advantages so dearly purchased; and the ironclad ship, protected by armour of moderate thickness, resumes those advantages which, under a somewhat inconsiderate impulse of popular opinion, were too little appreciated.'

Foreign
opinion of
British
ironclads

The most competent authorities abroad are unanimous in the opinion that the first-class ironclads of the British Navy are triumphs of naval architecture. Among the conspicuous merits of our latest ships, we may mention their proved capability of keeping the sea in any weather, their abundant coal-supply, and the powerful calibre of their artillery. It is not too much to say that, by the originality displayed in their design, and the skilful workmanship with which they have been constructed, the prestige of our country has been sustained, and in a high degree increased. If it were probable that the Navy would be required to operate chiefly in ocean warfare, it might be the wiser course to continue to build ships of the 'Inflexible' type, in preference to smaller vessels. But there is no immediate prospect of naval operations on the broad ocean. The principal maritime Powers are directing their attention chiefly to warfare of another kind—to the attack and defence of forts and harbours; and for coast operations ocean-going ironclads are not adapted. In the United States no new ironclads have been com-

menced since the close of the Civil War. In his report for 1875 the Secretary of the United States Navy says, 'Our circumstances do not require that we should take part in the rivalry between monster cannon and impenetrable armour, since few of our ports are accessible to vessels carrying either, and these may be better defended by attacking the vessel below her armour by subaqueous cannon and movable and stationary torpedoes.' In Russia attention has of late been directed chiefly to the circular ironclads, the 'Popoffkas,' intended solely for coast defence. In Germany it has been decided to lay down no more ironclads at present. In France the programme of shipbuilding was settled in 1872, when it was decided that sixteen first-class and twelve second-class ironclads should be built. Financial considerations have prevented the execution of these plans within the period of ten years, originally contemplated, and, while the delay has caused deep regret to many members of the French legislature, with others that regret has been tempered by the conviction that, in a period of such rapid transition, it was impossible to spend large sums on shipbuilding, with any confidence that the ships, when built, would represent the latest ideas of naval constructors.

Report of
Secretary
of United
States
Navy

In his essay, 'La Marine d'Aujourd'hui,' Admiral de la Gravière asks, but does not answer, the question—What kind of squadron will the admirals of 1882 be called upon to command? He appears so much in doubt as to future transformations of matériel, that his attention seems to be mainly directed to the effectual training of the personnel of the fleet.

Admiral
de la
Gravière

On examining our shipbuilding programme of the present session, one salient feature will be at once noted. With a single exception, that of an armoured torpedo

Our ship-
building
programme

vessel, all the armoured vessels proposed are of large tonnage. The list includes the following ships :

Agamemnon	each of
New Agamemnon	8,492 tons
Ajax	
Dreadnought	10,886 „
Inflexible	11,406 „
Nelson	each of
Northampton	7,323 tons
Shannon	5,103 „
Téméraire	8,412 „
Torpedo ram	—

It cannot be doubted that all the ships under construction will prove formidable additions to the Navy. It is not contended that the construction of first-class vessels of war should be continued ; but it is a subject for regret that, whereas, according to the Navy Estimates of the present session, it is proposed to build only 8,000 tons of ironclad shipping, we have so largely and rapidly increased the dimensions of individual vessels that the whole shipbuilding of the year is only sufficient to produce a single ship, and that ship liable to instant destruction by weapons of a comparatively inexpensive nature, which can be multiplied therefore in almost overwhelming numbers. Moreover, while the dimensions have been carried to the furthest possible point, there yet remain some unquestionable defects. The armament of our most recent ironclads is unsatisfactory. Their guns, although of tremendous calibre, are too few in number. In the excitement of action we cannot rely on perfect accuracy of fire, even were the field of view unobstructed by the smoke which must inevitably envelope the contending fleets. Of the uncertainty of artillery practice, no more striking proof could be produced than that which was quoted by Captain Price, in the course of the discussion on Captain Scott's

Defects
of recent
ironclads

lecture, delivered at the Royal United Service Institution, on the maritime defence of England. Captain Price stated that the only practical test as yet applied to our large guns, in respect to accuracy of aim, was made in 1870, when our three largest ships—the ‘Captain,’ the ‘Monarch,’ and the ‘Hercules’—were sent out from Vigo Bay to fire at a rock, distant about 1,000 yards. The day was almost absolutely calm. The rock was 600 feet long and 60 feet high, that is to say, twice as long and four times as high as a ship. The ‘Hercules,’ armed with 18-ton guns, fired 17 shots, of which 10 hit. The ‘Captain,’ armed with 25-ton guns, fired 11 shots, and made 4 hits. The ‘Monarch,’ also armed with 25-ton guns, fired 12 shots, and made 9 hits. Captain Price, arguing from these data, agreed in the opinion, previously expressed by Captain Colomb, that the ‘Monarch,’ which in six minutes from the time of opening fire would have fired 12 shots, could only expect to hit a sister vessel, at a distance of 1,000 yards, from twice to fifteen times out of every 100 shots. He further remarked that ‘as the size of our gun increases, so we must expect the accuracy of the gun to decrease.’

Uncertainty
of gun
practice

Captain Scott lays it down that the armament of a first-class fighting ship should not be less than one gun to every thousand tons displacement. The ‘Inflexible’ has only one gun to every 2,000 tons displacement, and her armament, being mounted in pairs in two turrets, and loaded and trained by mechanism, a great portion of which is common to both guns, cannot be reckoned as having the same relative value as four independent guns. If a projectile were to penetrate a turret, the pair of guns mounted therein would probably be disabled. Four guns, therefore, mounted in pairs, cannot be reckoned as equivalent to more than three guns mounted

Proportion
of guns to
displace-
ment

and worked independently. a weak point in the 'Inflexible' class that they have no light armament with which to defend themselves against gunboats and torpedo vessels.

Limit of
armoured
area

Again, the armour, in the latest designs, covers only a limited area of the sides of the ship; and the unprotected ends, even though filled with cork and coals, and subdivided into numerous cellular compartments, are alleged by Mr. Reed to be fraught with considerable danger to the armoured citadel. I am not competent to take any part in the controversy between Mr. Reed and Mr. Barnaby; but I venture to point to the present discussion as an argument of incontrovertible weight against the policy of building vessels of extreme dimensions and consequently excessive cost. If a new argument were needed, in order to show the desirability of distributing more widely the risks of naval war, and increasing the means of attack—objects which can be best attained by multiplying the number of our fighting ships—it would surely be found in the deplorable controversy which has arisen respecting the 'Inflexible.' Having enlarged the dimensions of a single ship to 11,400 tons, and having expended upon its construction a sum which may be estimated at not less than half a million sterling, we have the mortification of hearing from a high authority that our enormous and costly ship is not fit to go into action.

Defects of
'Inflexible'

There is reason to believe that other features in the most recent designs are not altogether satisfactory. The magazines are outside the citadel, with only a three-inch armoured deck over them. The weakness of the bow for ramming is a still more serious consideration. 'Suppose,' as has been suggested by a distinguished flag-officer, 'a ship with unarmoured ends should be

obliged to meet another, bow to bow, at full speed (a most likely occurrence); nothing could save her from immediate destruction, provided that her opponent were armoured, and therefore the stronger. If the "Devastation" or the "Dreadnought," which are armoured round the bows, were to steer straight for the "Inflexible," they would inevitably have the advantage over her weakly constructed bow. If the "Inflexible" were to endeavour to avoid the blow, she must expose her side to the enemy, which would be still more dangerous.

It is disappointing to be informed of the existence of so many defects in our most ingenious and costly ships; and the British public will probably be disposed to concur in the opinion expressed by Mr. King, of the United States Navy, in his description of the 'Inflexible,' quoted in the 'Engineer' of June 22nd: 'Almost every conceivable precaution,' he says, 'has been taken to make her secure from the ram and the torpedo. If, however, she should be fairly struck by a solitary powerful fish-torpedo, it is quite possible that she would be crippled, waterlogged, or possibly sunk.' The question, therefore, presented to us is whether two vessels of smaller dimensions, each carrying two 81-ton guns, instead of four, would not have been a safer and, in some respects, a better investment.

It was stated at the outset that it was not proposed to criticise the designs of our most recent ships of war, or to advocate any original views on naval architecture; but rather to ascertain the opinions of the most competent professional authorities, and to see how far the latest programme of shipbuilding was wisely framed for the purpose of carrying out their recommendations. The controversy as to the continued use of side armour must naturally arouse the greatest anxiety in the country.

Mr. King's
opinion of
'Inflexible'

Side armour
thick or
thin

It is said that unless armour be strong enough to keep out shells, it is worse than useless ; and armour, more or less impenetrable, even when limited to vital places, such as the water-line, the engine-room, and the boiler-space, involves a large addition to the cost, and an increase of dimensions, tending to diminish that mobility which is of the last importance.

Limit to
thickness
of armour

In considering this subject, it is essential to bear in mind that the increase in the tonnage of our most recent ships has been rendered necessary by the weight of their armour : that armour is a protection against artillery fire alone ; and that, while the power of the guns may be indefinitely augmented, there is an inevitable limit to the thickness of armour. The argument against armour was very ably summed up by Sir William Armstrong, in his letter to Lord Dufferin, chairman of the last Committee on Naval Designs, from which the following extract is taken :

Sir Wil-
liam Arm-
strong's
opinion

‘The foregoing considerations as to the present effects and probable future of guns, projectiles, and torpedoes lead me to the conclusion that no practicable thickness of armour can be expected to secure invulnerability for any considerable length of time. At present it is *only the most recent of our armour-clads that have any pretence to be considered invulnerable*. All the earlier vessels, when built, had just as much claim to be so regarded as the strongest ships of the present day ; yet they are now completely left behind, and are, in my opinion, much inferior to well-constructed, unarmoured ships. I venture to ask, What reason have we to suppose that the powers of attack will not continue quickly to overtake the increased powers of resistance, which we are applying at great increase of cost and at great sacrifice of general efficiency ? Every addition to the weight carried for defence must be

attended with a diminution of armament and of speed, unless the size of the ship be increased in a very rapid proportion. A continual addition, therefore, to the thickness of the armour involves either a continual reduction of offensive power, or such an increase in the size of the vessel and its consequent cost as must limit the production of seagoing ships of war to a number inadequate for constituting an efficient Navy.'

It may be thought that Sir William Armstrong, as an artillerist, would naturally be impressed with the irresistible power of guns against armour; but when we turn to the official declarations of the constructors themselves, we find them substantially in accord with the view expressed in the foregoing extract. The papers relating to the design of the 'Inflexible,' recently presented to Parliament, contain a well-balanced summary of the arguments for and against the continued use of armour:

'We do not see that any increase in the penetrating power of guns can make it desirable to dispense with hull armour, merely because it is penetrable to some guns within certain ranges. It will always remain impetrable to all guns beyond certain ranges, and to many guns at all ranges, and must therefore be advantageous as a means of security to the vital parts of the ship.

Report on
design of
'Inflexible'

'The limit to its thickness is to be found, we think, in the size and cost of the ship.

'So far as we have gone at present, fourteen inches of armour have been found to be consistent with high speed, perfect turning power, and moderate draught of water. No one of these conditions imposes a limit; but a single ship costs nearly half a million sterling, and it is exposed to many risks.

'The losses and casualties of a naval engagement

I.

Y

would do much, there is no doubt, to bring out the imminence of these risks, would perhaps show that the large and costly ship is even more exposed to them than the smaller one.

'It may be that the limit of size and cost has been reached in the "Fury," and that, with her bulk and cost, the maximum of advantages may be obtained.

'We are ourselves disposed to think that this is so, and that there may be retrogression in this respect as more experience is gained with the powers of the torpedo, the ram, and other submarine instruments of attack.'

Mr. Barnaby on
defence
against
the torpedo

Let us now refer to another official statement, emanating from the Council of Construction at Whitehall. On April 6th of last year Mr. Barnaby read a paper at the Institute of Naval Architects, in which the relative merits of very large ships, as compared with vessels of more moderate dimensions, were ably discussed. 'The attack,' he said, 'of several fast unarmoured rams and torpedo boats upon a somewhat slower armoured ship, although involving the probable destruction of some of the attacking vessels, would still expose the armoured ship to a risk which she ought never to encounter alone. The assailants ought to be brought to bay, before they could get within striking distance of the ironclad, by consortships armed, like the attacking vessels, with the ram and the torpedo, which may take, like them, the chances of being sunk. In other words, I contend that the defence against the ram and the torpedo must be sought for, not in the construction of the ship alone or mainly, but also and chiefly in the proper grouping of the forces at the points of attack. Each costly ironclad ought to be a division defended against the torpedo and the ram by smaller numerous but less important parts of the general forces. If the foregoing considerations are correct, there is still

place in naval warfare for costly ironclads with thick armour and powerful guns. There is place also for association with them of unarmoured vessels armed with the torpedo and manned by brave men.'

There was present among Mr. Barnaby's audience the ex-Controller of the Navy, Sir Spencer Robinson.

Sir Spencer
Robinson's
opinion

In the course of the discussion on the paper just quoted, he gave his full approval to the proposal to provide a supplementary flotilla as necessary auxiliaries to a fleet of ironclads. 'No suggestion,' he said, 'more valuable for the purposes of war has been made by any person within my knowledge than the able suggestion of Mr. Barnaby, that the true mode of defending our heavy ironclads from these attacks is by the counter-attack of torpedoes and rams. No fleet, therefore, can be considered a fleet, and, in my humble opinion, no ship like the "Inflexible" can be considered a ship of war, unless provided with attendant rams and torpedoes to meet those attacks to which she is sure to be subjected. I am quite satisfied also that Mr. Barnaby has hit upon the right plan of defending such ships from the attacks of torpedoes. It is by counter-attack that you must succeed, and not by piling mountains of iron upon the sides of your ships.'

Though not a naval architect, Sir Samuel Baker has won a high reputation among his countrymen for distinguished success in another field of effort. Having directed his attention as an outsider to the subject of the present paper, he arrived at a conclusion almost identical with that expressed by Mr. Barnaby. Sir Samuel Baker's views were set forth in a letter to Mr. E. J. Reed, and were rightly deemed so sound a contribution to the discussion, that they were published as a note to

Sir Samuel
Baker's
views

Mr. Reed's speech, in the 'Transactions of the Institute of Naval Architects.' They were to the following effect :

'Accepting as a matter of course that the comparatively short handy ironclad must be the fighting giant of the present and future, instead of the long ships of the "Minotaur" class, it appears to me that *every* ironclad should possess *two* tenders that would *absolutely be inseparable attendants*. These tenders should be wooden vessels, with an *immense* speed, fitted as rams—tonnage about 2,500.

Rams
tenders to
ironclads

'Each accepted ironclad of the Navy would thus be accompanied by two fast handy rams, which would never leave her, but would belong to her as entirely as the horses do to the field-gun.

'These rams would, in action, wait upon the ironclads. Each ram-tender would be provided with two torpedo steam-launches—thus in smooth weather a single ironclad (carrying herself two torpedo launches) would exhibit force as follows :

- 1 Ironclad,
- 2 Rams,
- 6 Torpedo launches.'

Opinions of
American
naval
officers

The advice of officers who have been engaged on active service will naturally be received with special deference. At the close of the Civil War, the Secretary of the United States Navy invited each of the flag-officers of the fleet to prepare a report on the type of ships which they considered it desirable to introduce into the American service. Several very interesting and valuable statements were submitted, among which I would more particularly refer to a paper by Admiral Goldsborough, which shows a degree of wisdom and forethought far in advance of the time when it was produced. Writing in 1861, he says :

'A marked pause must occur in the progress of ordnance before a fixed or definite conclusion can be reached as to the relative immunity obtainable by iron plates. Absolute immunity is out of the question.

Admiral
Golds-
borough

'That progress has already produced the effect of restricting their application, in the case of sea-going vessels, to the more vitally exposed parts ; and it is quite possible that it may finally establish the conviction that such plating for such vessels is really of no marked consequence.

'In the meantime the tendency of its effects must be to impress the value of rams.

'The protection of harbours nowadays does not lie in forts ; it lies essentially in powerful steam rams, aided, when necessary, by obstructions in passage-ways.

'Rams, intended purely for harbour defence, would be better without than with guns. They themselves are to be the projectiles, and the steam the powder.

'To fit the rams for guns would be to swell the item of cost largely, and thus abridge their multiplication.

'The essential points to be secured in these rams, each to a degree as consistently with all the rest as practicable, are great strength throughout every part of the hull, not overlooking the bottom by any manner of means ; every protection that supportable plating can afford, a high velocity, an ample security of machinery, the utmost rapidity in turning, and a suitable bow.'

The next great action, after the close of the Civil War in America, was fought at Lissa. What did the officers in command give as the result of their tragical experiences on that occasion ? Their views were quoted by Captain Scott in his lecture (to which reference has already been made) delivered last year at the Royal United Service Institution. 'The ram,' he said, 'has

Lissa

been aptly termed the "naval bayonet," and is a weapon which, if handled with skill and pluck, will prove invincible. Its special fitness for British sailors was referred to in my last lecture, and the chief of the Naval Constructive Department of the nation which used it with such effect off Lissa says of this weapon—when speaking of the reconstruction of three vessels of the Austrian Navy at the cost of one ironclad—"That we, as the result of this cheap conversion, now possess three rams, the most dangerous and secure weapons, I consider, and compared with which, the action and effect of the aggressive torpedo is, in my opinion, doubtful and insecure, and may easily endanger the ships of its own fleet."

Admiral
Persano
on the ram

Admiral Persano's memorandum on the battle of Lissa, also quoted by Captain Scott, would seem to imply that the experiences of the engagement had made the same impression on the vanquished as upon the victors. 'As encounters between ironclads will,' he said, 'be decided rather by the ram than by the fire of artillery, that fleet would undoubtedly win the battle which had the greatest number of ships fitted with double screws.'

Admiral
de la
Gravière

Turning to the French Navy, we find that Admiral Jurien de la Gravière predicts that 'ships will fight in the future with the rams alone. The captains will not dare to open fire, lest their view of the enemy should be obscured by the smoke from their own guns. When the two fleets have passed through one another, they will turn and renew the attack. In the execution of this manœuvre the slowest ships will expose their broadsides to the enemy, and will inevitably be destroyed by the ram.' Armour is valuable only as a protection against the fire of artillery; and the ram and the tor-

pedo are now regarded by the highest naval authorities abroad as their most formidable weapons.

M. Dislère, in his latest publication, expresses an opinion that the difficulties in the use of the torpedo in action are not as yet surmounted. 'But this fact,' he says, 'only lends the greater importance to the ram, and renders it the more necessary to reduce as much as possible the dimensions and the displacements of our fighting ships.'

M. Dislère

While the efficiency of the ram was signally manifested in the action off Lissa, the destructive powers of the torpedo have been exhibited on a very recent occasion in the terrible destruction of a Turkish monitor on the Danube. In the United States great attention has been given to torpedo warfare. All the ships of the American Navy are provided with the spar torpedo, and efforts are continually being directed to the production of an efficient automatic subaqueous torpedo. The chances of attack by means of unarmoured steam launches have also been considered; and on this subject the views of the majority of naval officers are contained in an article in the 'United States Army and Navy Journal' of June 2nd, from which the following is an extract:

Power of
the torpedo

'The steam launch is by no means so terrible an invention as is supposed. A single discharge of grape from a ship, attacked by the Thorneycroft launch, will destroy and almost instantly sink this supposed irresistible ironclad destroyer.

American
view

'Vessels intended to carry torpedoes to be exploded against ships armed with guns are practically worthless, unless capable of resisting shot.

'But against an assailant possessing a torpedo boat with a flush impregnable deck and movable submerged torpedo, as described in our last issue, neither grape nor

rifle shot will avail ; the vessel attacked, whether a little monitor or a first-class ironclad ship, will certainly be destroyed, unless the position and other circumstances admit of rapid retreat.'

In the Navy Estimates for the current year provision is made for commencing the construction of a vessel of the type recommended in the American journal. It cannot be doubted that such vessels would prove extremely formidable in action.

'Shah' and
'Huascar'

The recent encounter between H.M.S. 'Shah' and 'Amethyst' and the Peruvian ironclad ship 'Huascar' is full of interest, in relation to the question of retaining armour for the protection of ships of war. The results of the combat are obviously in favour of the retention of armour. Though the 'Huascar' was struck 100 times, only one 9-inch shot penetrated three inches into the turret, and that without doing any material damage. The engagement was fought at distances varying from 200 to 3,000 yards, and lasted three hours. As the plates of the 'Huascar' were only $4\frac{1}{2}$ inches in thickness, the armour would easily have been penetrated by the 'Shah's' 9-inch and 7-inch guns, provided that the shot had struck at right angles. The experiences of the action show how rarely this is likely to occur in practice, and how immensely the power of destruction is reduced when the armour is struck obliquely.

Inclined
armour

The lessons to be learned from the engagement between the 'Shah' and 'Huascar' will doubtless be appreciated by the constructors at Whitehall. They will probably adopt in the future the system of inclined armour, so ably advocated by the editors of the 'Engineer.' In an article which appeared in that paper on April 14, 1876, it was shown that, if the armour were inclined upwards at an angle of 45 degrees, a thickness of 12

inches would be sufficient to resist even the 81-ton gun, whereas, with armour on the vertical system, twice the thickness would be required. It was further shown that by the reduction in the breadth of the armoured deck over the central citadel, the top-weight would be considerably reduced, and that the armour protection on the sides of the ship might be proportionately extended. By the adoption of inclined armour a larger reserve of stability may be secured, and so the objections which have been raised by Mr. Reed to the 'Inflexible' may be removed in future designs.

In conclusion, a few suggestions may be offered as to the shipbuilding policy most suitable for a period of rapid transition in the modes of naval war and naval architecture. It is not necessary to spend a larger sum than at present, nor is it proposed that the construction of ships of the best type for ocean warfare should be discontinued. It must be admitted by every English statesman that so long as we retain our colonial empire we must maintain a fleet, on which we can rely to guard our communications across the seas. It does not follow that any ships destined for this service need exceed a displacement of 8,000 tons, which is less by one-third than the tonnage of the 'Inflexible.' With a view to a reduction of dimensions, it would probably be the wiser course to aim at making our ships unsinkable rather than impenetrable, to increase the strength of the structure below the water, and to diminish the armoured protection of the guns. If the guns should be disabled, the ram could still be relied upon, provided the vitals of the ship remained intact.

Shipbuilding policy to be followed

The most recent experiences with the ram and the torpedo point distinctly to the importance of numbers, to the unwisdom of placing too many eggs in one basket,

Importance of numbers

Smaller
ships
desirable

and to the expediency of distributing the inevitable risks of naval warfare, by sending forth fleets, not only strong in the power of the individual ships of which they are composed, but strong in regard to numbers. To this view Mr. Reed himself has given his sanction in a recent debate in Parliament, when he said that the increased efficiency of the torpedo made smaller vessels desirable. It is most unwise to spend all the money devoted to the construction of vessels for the line of battle in building ships of the 'Inflexible' or 'Agamemnon' type. Let us appropriate one-third or one-half from the vote for armoured ships to vessels, let us say, not exceeding from 2,000 to 3,000 tons. With these restricted dimensions we cannot have all the qualities it has been attempted to combine in the 'Inflexible,' but we can have vessels formidable either with the gun, the ram, or the torpedo; and, in proportion as we add to the number of our ships by reducing the dimensions of individual vessels, so the loss to a fleet of any single ship, disabled or destroyed in action, will be less disastrous.

The administration of the Navy must never be degraded into a party or personal question. We are all united in one common object—that of creating and maintaining a powerful Navy. The supplies necessary for such a purpose will always be cheerfully granted. The question we have to consider is whether the money voted for the Navy is effectively applied to the great national object in view.

Develop-
ment of the
attack

The development of the means of defence has not kept, and cannot keep, pace with the increasing power of offensive naval weapons. Should it not therefore be the policy of our naval administration to expend a larger proportion of the ample resources at their disposal in so multiplying their means of attack, that no hostile fleet

will venture to expose itself to inevitable destruction by engaging a British squadron?

At the present moment the controversy as to the stability of the 'Inflexible' has aroused a painful feeling of anxiety. The Government have been well advised in appointing a committee of inquiry, composed of men eminent for their scientific attainments, and holding independent professional positions. Neither Parliament nor the country would have been satisfied with an expression of confidence emanating from Whitehall, and unsupported by other professional testimony. The controversy which has been raised is unprecedented in its character. A difference of opinion has been expressed between two authorities of exactly equal rank. One is the present, and the other a past, Chief Constructor of the Navy. They differ on a question of fact, which can only be exhaustively investigated and decided by men of competent scientific attainments. It was merely throwing dust in the eyes of members of Parliament unskilled in the science of naval architecture to invite them to inspect a model, which might or might not be an exact model, and to observe the behaviour of that model in a trough, under conditions which might or might not represent the conditions to which the ship would be exposed in action, or in navigating the seas.

An objection may be entertained in some quarters to the appointment of a committee or a commission to consider the designs of our ships of war. It may be thought that the Admiralty are thereby relieved of that responsibility, which ought not to be shared with any other co-ordinate authority. It must, however, be acknowledged that at the present time the shipbuilding problem presents difficulties quite unparalleled in the previous history of the Navy. Mr. Samuda, in seconding

The
stability
of the
'Inflexible'

Object
of the
'Inflexible'
Committee

a motion introduced in the House of Commons by Mr. Seely in 1868 said—as I think, truly—that when a great policy had been inaugurated, he could well understand that a department of the State might efficiently carry it out; but it was unlikely that such a policy could be initiated by a Government department. The State, by appointing a commission of inquiry, would obtain the assistance of men of the greatest ability, experience, and knowledge in the kingdom, who would freely give evidence. Similar views were expressed, though with becoming official reserve, in the same debate by Mr. Childers. He wished for some plan which, without diminishing the responsibility of the constructive department of the Admiralty, would give it the advantage of a certain amount of scientific investigation and advice.

Investigation such as that proposed in the case of the 'Inflexible' can scarcely fail to do good. The public is supplied with the latest information on the condition of the matériel of the Navy, and the Admiralty may receive novel and valuable hints for the improvement of the fleet.

'Shah' and
'Huascar'

The first intelligence of the engagement between the 'Shah,' the 'Amethyst,' and the 'Huascar' had not reached this country when the foregoing pages were written. Even now official information is wanting. What we already know, however, is sufficient to prove that evolutionary qualities are of the highest importance, that deep draught is a serious disadvantage, and that a mixed armament, including an adequate proportion of armour-piercing guns, is necessary to constitute an efficient vessel of war. When we take into view the expenditure on the unarmoured 'Shah,' and the circumstance that she was manned by a crew of 600 men, it is unsatisfactory in the highest degree to know how unequal was the battle between the British flagship and the Peruvian ironclad.

VIII

*THE REPORT OF THE COMMITTEE ON THE
'INFLEXIBLE'*

LETTER TO THE 'TIMES,' DECEMBER 25, 1877

THE report of the 'Inflexible' Committee is the most important document, relating to naval construction for war purposes, which has appeared since the report of the Committee on Designs. If it lead to the adoption of a policy of distribution of the inevitable hazards of war, as opposed to the concentration of risk in a few ships—a policy which, in common with other naval critics of higher authority, I have long advocated in the 'Times' and elsewhere—I for one shall hail the publication of this report with deep satisfaction.

It may, however, be asked whether the special questions which were referred to the Committee are satisfactorily answered. An examination of the report will show that they are. We are told that the complete destruction of the unarmoured ends of the 'Inflexible' is an extreme assumption; that the process of transition from absolute security to a state in which the efficiency of the ship would be impaired, and her seaworthiness exposed to doubt, must be gradual; and that, while the armoured citadel is not invulnerable nor the unarmoured ends indestructible, the unarmoured ends are as well able as the armoured citadel to bear the part assigned to them in encountering the various risks of naval warfare.

Satisfactory
nature of
the report

In the judgment of the impartial public, I venture to think, these assurances of the Committee—a Committee most efficiently constituted for the conduct of the investigation entrusted to them—will be accepted as satisfactory. It is not affirmed that the crew of the 'Inflexible' will be exposed to no risk in a naval action; it is affirmed that they will be entrusted with a very powerful instrument of war—one which may reasonably be expected to give a good account of the enemy—long before the unprotected ends are so completely gutted as to compromise the safety of the ship. The gallant men who compose the British Navy know very well that, if they are to await the construction of an indestructible ship and invulnerable armour, they will never again be required to undertake the active duties of their profession.

Mr. Reed's
designs

No naval architect has been so ingenious and progressive as Mr. Reed. Our present armoured Navy consists mainly of his productions. But if it is to be laid down that no ship is satisfactory unless she is invulnerable, we shall find ourselves under the painful necessity of condemning all his former designs. The amount of armour which can be carried on a given displacement being limited, the naval architect has to choose between protecting a lesser area by armour of a greater thickness and protecting a larger surface with thinner armour. As it is pointed out in the able treatise of M. Marchal, the process of *décuirassement*, or reduction of the armoured surface, was coeval with the first application of armour to the 'Gloire' by M. Dupuy de Lôme. In his next ship, the 'Solferino,' the armour was removed from the least vital parts, in order to protect the vital places with heavier armour. If the 'Inflexible' has a larger area of unarmoured side than any other

Restriction
of armour
to vital
parts

armoured ship, she carries heavier armour for the protection of her vitals. The stoutest plates of the 'Inflexible' are 24 inches in thickness. The 'Duilio' is protected by 22-inch plates, the 'Foudroyant' ¹ by 15-inch, and the 'Peter the Great' by 14-inch armour.

The 'Inflexible' was protected by 24-inch armour on the ground that iron plating was a useless encumbrance unless it was impenetrable, and that, owing to the progress of gunnery, a less thickness than that adopted was of no avail. If, however, armour of less than 10 inches is no longer recognised as affording any protection against naval guns, what are we to say of the 'Bellerophon,' a great triumph of Mr. Reed's genius? What are we say of the 'Audacious' class, or the 'Swiftsure' type, protected by 8-inch armour at the water-line, and that for only one-third of their length? And what of other ships, equally vulnerable, on which, notwithstanding, we place our reliance as integral portions of the Navy? If the 'Inflexible' is to be condemned because she is vulnerable in her unarmoured ends, with much more reason should every ship of older date be condemned. Armoured they may be, but the armour they carry is not proof against the most powerful guns. Being vulnerable, their crews are exposed to risks, and those risks, if we are to accept the arguments directed against the 'Inflexible,' the seamen of the modern Navy ought not to be called upon to undergo.

The truth is the protection afforded by armour is only relatively, and never absolutely, effective. The engagement between the 'Shah' and the 'Huascar' proved the great advantage of armour of the moderate, perhaps in these days contemptible, thickness of 4 inches. By reducing the thickness of the armour the 'Inflexible' might have been protected over a larger area. If the

Armour of
'Inflexible'

Armour
protection
relative

¹ Now 'Courbet.'—ED.

surface protected had been increased and an equal thickness of armour had been retained, additional length and displacement would have been necessary. Any modifications in the latter sense it would have been impossible to approve.

Complete
immunity
from risk
not possible

It is impossible to secure immunity from risk in battle. All that we can ask from our constructors is that they shall provide the Navy with the most effective ships which the science of the day can contrive. From the administrative heads of the Navy we claim that those ships shall be sufficient in number to secure our maritime ascendancy. Our fleets for the line of battle should be composed of large numbers of vessels, each possessing the means of fighting any ship of the enemy with the ram, the gun, or the torpedo; and combining with that destructive power as much protection as can be given without adding unduly to dimensions, and so depriving our fleets of that advantage, in point of numbers and mobility, which every step in gunnery and torpedo warfare shows to be more and more essential.

'Inflexible'
alterations

In conformity with these elementary principles, I would suggest to the new First Lord of the Admiralty, of whom such high hopes are entertained, that it would be much more satisfactory to complete the 'Inflexible' according to the original design, rather than attempt any considerable alteration. The extension of the cork chambers and the additional pumping power recommended by the Committee will be valuable improvements not involving any structural change. Beyond these improvements the process of remodelling should not be carried. The Admiralty and the country will know that they possess in the 'Inflexible,' as she is, a most powerful ship—indeed, the most powerful ship in any Navy. The valuable suggestions of the Committee, in

reference to reduction of length and increase of beam, can be embodied more economically and more satisfactorily in those new designs, which I trust will shortly be matured and carried into execution.

In the discussions between Mr. Reed and the constructors at the Admiralty it is especially to be observed that the security of the 'Inflexible' has been considered solely with reference to artillery fire. No allusion has been made to the far more formidable risks from an attack by the torpedo or the ram. The only defence which the 'Inflexible' possesses against the latter weapons consists in her speed and the facility with which she can be manœuvred. I should, therefore, deprecate in the strongest terms any modifications in the structure of the ship which, while increasing the armoured surface, would have, as a necessary and most regrettable consequence, a diminution of speed. In securing additional protection against the uncertain fire of naval guns, you may expose a valuable ship to grave risks from other weapons.

Danger
from ram
and torpedo

I conclude with a few observations on the policy of future construction. It is impracticable to produce ships equally adapted to perform all the various duties of the British Navy. We have to provide for the defence of our coasts. We have to hold our own upon the high seas and to protect our foreign commerce. The best types for coast defence must be determined by local circumstances. Speed is not necessary. Moderate draught is indispensable. The weapon with which vessels intended for coast defence should be armed will be in some cases the ram, in others the gun, and in others the torpedo. A certain proportion of the vessels for coast defence should be protected by armour. In all cases they should be of restricted dimensions. A

Future
policy in
shipbuilding

limited coal-supply will suffice. For ocean cruising, the mastless turret-ship, with sufficiently high freeboard, is the accepted type. But every 'Inflexible,' or improved 'Inflexible,' should be the *point d'appui* of a division, composed of armoured rams, armed with one heavy gun, with which should be associated a cloud of torpedo boats. These latter should lie in wait, beyond the range of the heavy guns of the enemy, ready to rush into the fight after the engagement has begun, and, under cover of the smoke, deal destruction right and left.

Material
for armour,
and its
disposition

Recent experiences seem to point to the use of steel plates in combination with rolled iron ; to the advantages of the dome shape for turrets ; and of inverted armour for the protection of the sides of ships. Against circular, dome-shaped, or inverted armour, normal hits must be rare. The power of resistance of armour is increased in proportion to the angle at which it is struck, in accordance with the well-known axiom that the angle of incidence is equal to the angle of reflection.

Protection
of com-
merce

The task of protecting our foreign commerce has been materially simplified by the opening of the Suez Canal and the more extended use of steam. Our external trade may be divided into the following great branches—the East Indian, the China, the American, and the Colonial. The first two are now carried on mainly in steamers. The trade with the East is conducted in vessels of varying tonnage, steaming at moderate speeds. This branch of our trade is most open to attack. To protect it we want a numerous fleet, the vessels composing which need not carry sufficient coal for extended ocean voyages, nor do they require such high freeboard as ships intended to steam at speed against the protracted winter gales of the North Atlantic. By adopting moderate dimensions, which the peculiar nature of the service

fully justifies, it might be quite possible to establish a continuous patrol along the whole line of that long but narrow band of sea, on which our trade in steamers with the East and China is concentrated.

The trade with North America now follows the defined tracks known to Atlantic voyagers as the outward and homeward 'steam lanes.' These routes might be patrolled by a squadron; though the great speed which commercial competition has rendered necessary in the North Atlantic trade would enable such ships as the 'Russia,' or the 'Britannic,' or the 'City of Berlin,' to escape without difficulty from the pursuit of privateers. Men-of-war of the 'Iris' class are not to be found in foreign navies in numbers sufficient to cause anxiety to British shipowners. Vessels of the 'Iris' class are sensibly inferior in coal-carrying capacity to the larger merchant ships. They could not, therefore, be employed in convoying duties, neither could they follow a retreating enemy of nearly equal speed in a long chase in mid ocean. Our first-class merchant steamers should be sufficiently armed to protect themselves. A considerable number would probably be employed in the Navy in time of war.

Trade
routes

As an attentive and impartial observer of contemporary naval administration, at home and abroad, I can assure my fellow countrymen, few of whom have the opportunity of perusing the writings of foreign authors on such subjects, that they may place undoubting confidence in the Constructive Department of the Admiralty. The present constructors and their able predecessor and now most powerful critic alike merit the grateful appreciation of the public. We have made mistakes in the past. It is idle to expect that they will be entirely avoided in the future. We are in a situation of excep-

Ability of
our Con-
structive
Department

tional difficulty. We are the first naval Power, and, by reason of our unique and fortunate insular position, the only great Power to which the command of the seas is of vital consequence. The constructors of other navies can afford to await the result of our costly and not always successful experiments. We cannot stand still. When, therefore, we consider that we have been in so large a sense the pioneers in the remarkable and revolutionary changes in the naval architecture for war purposes of the last decade, we have reason to be satisfied that so small a proportion of our expenditure has been thrown away. With the melancholy exception of the 'Captain,' there has been no example of flagrant miscalculation ; and it is certain that the catastrophe referred to would not have occurred if the responsibility had not been removed from the permanent staff at the Admiralty and divided, in proportions not accurately defined, among many counsellors.

Normanhurst.

IX

OUR NAVAL POSITION AND POLICY

PAPER READ AT THE ROYAL UNITED SERVICE INSTITUTION,
FEBRUARY 22, 1889

HAVING dealt with the amount of building required in the Navy, in an address recently delivered at the Mansion House, I propose to day to treat of our shipbuilding with reference to types, and to close with some remarks bearing on the efficiency of our dockyard administration. I am fully sensible that the undertaking is hazardous, but am encouraged to persevere by the controversies of the experts. It may be that a mere layman, after calmly hearing both sides, may reach conclusions not unworthy the consideration of those who, if they know more are perhaps less able to be impartial.

I commence my task with a brief review of recent shipbuilding abroad and at home. Having traced the direction which contrivance and invention have lately taken, we may perhaps find some indications to guide us in our programme of shipbuilding for the near future.

First, let us review the ships building abroad. In the class of battle-ships, France has adhered chiefly to a type much admired in our own Navy. The French ships are defended by a continuous belt, and they have the advantage of a high freeboard. In our ships the

Review of
shipbuilding
abroad

heavy guns are better protected, and recently we have established a decided superiority in speed. The Italian constructors, while building vessels of the largest dimensions as yet accepted, have thrown off belts, preferring other methods of protection for the vitals of ships. In armaments, and in armour for the protection of guns, in speed, and coal endurance, their ships are matchless. The Germans are imitators rather than pioneers in matters of construction. The United States, after a long pause, are adding to their fleet several ships, in which are combined the best features of recent construction elsewhere. The Russians are throwing their main efforts into turret-ships heavily armoured and armed.

Criticism
on the
'Admiral'
class

Neither abroad nor at home are the constructors allowed to pursue their way unchallenged by criticism. In England, among ships of recent construction, the 'Admiral' class and the belted cruisers are the types which have been most criticised. These classes are so numerous represented in the Navy that it would be little short of a national disaster if we were driven to regard them as absolute failures.

Of the 'Admiral' class we have built six, and they have cost nearly four and a half millions sterling. Sir Edward Reed would remove the 'Admirals' from our list of battle-ships on the ground of deficiency of protection at the water-line. Admiral Hood and Mr. White, in their evidence before the Select Committee on our Navy Estimates, refused to concur in this condemnation. Referring to the risks of the loss of stability by the penetration of the unarmoured sides near the water-line, Mr. White told the Committee that the 'Admiral' class would fight with risks of the same kind as the ships with narrow belts of foreign navies. His

views were confirmed by Admiral Hood, who said that, for the fighting purposes of a ship, under the usual conditions as he found them at sea, his experience led him to the opinion that it was not of vital importance whether the upper edge of the belt was flush with the water or 18 inches above the water-line. Whilst expressing a favourable opinion generally of the 'Admiral' class, Admiral Hood had considered it desirable to give more protection to the 'Nile' and 'Trafalgar' class, for the designs of which he was personally responsible. In these two ships the 20-inch steel-faced armour is reinforced by inner armour with a strong system of girder work. The armour is not only thicker, but it extends over an area of side considerably larger than in the case of the 'Admiral' class. It is important to take note of the sacrifices required to secure this increased amount of armour. The tonnage has been raised from 10,600 to 12,000 tons, and the cost from 729,000*l.* for each ship to 854,000*l.* An addition of 1,400 tons to the displacement, and an increased expenditure of 124,000*l.*, is the price which it has been necessary to pay for the additional defensive power of the 'Nile' class. There has been no development of offensive power in the later ships. In point of speed and coal endurance, the 'Nile' and 'Trafalgar' are somewhat inferior to the 'Admiral' class, although their armament is approximately the same.

Admiral
Hood on
'Nile' and
'Trafalgar'

A general summary of the fighting efficiency of the 'Admiral' class was given by Mr. White, in answer to a question put by Mr. Maclean, a member of the House of Commons Committee. Mr. White pointed out that the 'Admiral' class had an armament of unrivalled power. The disposition of the armament was, by the common consent of naval authorities at home and abroad, the

Mr. White
on 'Admiral'
class

best afloat. The guns were carried high above the water ; the auxiliary armament was very powerful. The claim put forward for the 'Admiral' class, that they should be rated as battle-ships, was not, in Mr. White's view, to be disallowed because their belts were narrow and did not go to the ends. His definition of a battle-ship was a vessel which, carrying heavy guns, has its auxiliary guns mounted in armoured stations and has the vitals efficiently protected. He considered that the Italian ships, the 'Sardegna,' the 'Umberto,' and the 'Sicilia,' were battle-ships of the first rank. They had no side armour, but they had strongly curved decks and a magnificent armament, all the heavy guns and the hydraulic and other mechanism necessary to the working being protected by thick armour.

Distribu-
tion of
armour

It will be admitted that the 'Admiral' class would be more satisfactory if they had greater distribution of the armour. Keeping within the limits accepted as to size and cost, and having a fixed amount of weight available for armour, it might have been preferable to take something from the armour on the barbettes, in order to give more protection to the battery. It is questionable whether it would have been expedient to give an additional proportion of weight to the protection of the water-line.

Belted
cruisers

Let us pass on to the belted cruisers. Seven vessels of this type have been built at an expenditure of three and a half millions. The position of the belt has been made the ground of a severe condemnation of these vessels. The Admiralty witnesses were closely questioned by the Committee on the Navy Estimates as to the efficiency of the belted cruisers. Neither Sir Anthony Hoskins nor Admiral Hood nor Mr. White concurred with the critics in attaching a vital importance to the

position of the protective belt. Sir Anthony Hoskins gave his views in the form of an argument. He did not think it wrong to send the ships to sea, though he would have wished that the mistake in the calculations for the construction of the ships had not been made; but, while making this admission, he urged that the armour belt was placed on the ship's sides for the protection of the vitals. As the ship goes down in the water, the vitals are submerged and thereby protected; as the ship lightens, and the vitals become exposed to shot, the belt also rises and gives protection. It is undesirable that a ship should have a greater draught than she is designed for, but in the case of the belted cruisers the vitals are equally protected, whether the armour be above or below the water-line.

View of
Sir Anthony
Hoskins

In the important element of speed the belted cruisers have more than fulfilled the conditions laid down for the original design. Outside Plymouth breakwater, the force of the wind being 8, the 'Orlando' steamed 13·8 with one-third power, 16 knots with two-thirds power, and 17·141 with forced draught. In the smooth water off the Maplin Sands the 'Immortalité' did 19½ knots with forced draught. The gunnery trials have been satisfactory. Belonging to the class of protected rather than armoured vessels, the belted cruisers do not seem to merit the condemnation which has been passed upon them for deficiency of armour. It is perhaps the greatest defect of this class that, as at present armed, they require a complement of more than 500 men. All our cruisers, as Admiral Baird pointed out to the Committee on the Naval Manœuvres, are overloaded with armament. Mere weight of armament will not make an unarmoured ship a battle-ship; and if regarded, as they should be, as cruisers, our belted vessels are far more heavily armed

Speed of
'Orlando'
class

Overweight
of arma-
ment

than French cruisers of corresponding *tonnage*. The 'Cécile,' of 5,766 tons, carries no gun heavier than the 5-ton gun. In the case of the 'Piemonte,' recently purchased by Italy from the Armstrong firm, the armament was changed from heavy pivot guns to four 111 pounders, quick-firing guns, mounted on sponsons, two on the bow and two on the quarter. If the armaments were reduced the complements could be reduced. The comfort of the crews of Her Majesty's ships is not undeserving of consideration. Manned as at present, the belted cruisers are overcrowded, and the discomfort caused by the want of space is aggravated by insufficient ventilation. This should be, and can be, remedied. Defective ventilation is a frequent and a grave fault in our ships-of-war. It makes the heat below intolerable. The falling off at sea from the speed at the measured mile is largely due to the closing up of openings while completing ships for commission.

Crew over-
crowded

Of the vessels which have commanded general approval, it is not necessary to say much. The 'Victoria' and the 'Sans Pareil' are the most powerful single-turret ships which have yet been built. They carry a pair of 110-ton guns in a single turret. The bow fire will be of crushing power. The auxiliary armament is very formidable; but the guns are fought behind easily penetrable armour. If shells are employed with high explosives, a corresponding defence by armour will be required for all the fighting positions in the ship.

'Victoria'
and 'Sans
Pareil'

In reviewing our most recent proceedings in relation to shipbuilding, the decision taken by the Admiralty, as reported in the public prints, in relation to the refit of the 'Minotaur,' seems open to criticism. For war, the value of these ships depends mainly on their speed and coal endurance. In this regard they can never be

Refit of
'Minotaur'
class

satisfactory so long as their old-fashioned engines and boilers are retained. An expenditure of 50,000% is wasted on a policy of half measures. With triple expansion engines and suitable boilers, the ships would have a high speed and good coal endurance ; with our old engines and old boilers they will have neither the one nor the other.

In the cruisers laid down by the present Admiralty, speeds rarely attempted before in vessels of corresponding dimensions have been reached. In the 'Blake' and the 'Blenheim' the dimensions have been carried to 9,000 tons. It has been found necessary to accept these unprecedented dimensions in order to secure decided superiority over the latest cruisers in construction abroad. Without entering into the details of the design, the 'Blake' class may be regarded as a type of which we shall require more than two to give effective protection to our fleet along the great ocean highway to Australasia.

'Blake'
and 'Blen-
heim'

In the recent construction for the Navy, the building of gun-vessels of the 'Pheasant' class would seem to yield the least satisfactory results. The great improvements which mark the new class of gunboat will at once be admitted. It is sufficient to walk round the steam basin at Portsmouth, and to compare one of the new class with the 'Medway,' to appreciate how great has been the advance in the later designs. It is, however, a question whether powerful cruisers are not more necessary than gunboats for the reinforcement of the Navy. For the police of the seas we have no lack of vessels on the Navy List. If our gunboats are worn out or obsolete, it might have been feasible to utilise the corvettes of the 'Gem' class and the 'C' class. With reduced armaments and reduced complements our corvettes might have taken the place of the sloops, and our sloops might have relieved the gunboats.

Gunboat
construction

Battle-ship
construction

Passing from ships lately built or building to the programme for the future, it should be the first object to strengthen the fleet in the line-of-battle. In ships of the first class, offensive and defensive powers not inferior to those of the 'Nile' and the 'Trafalgar' will be insisted upon. The new vessels to be laid down should not be mere repetitions, but, if possible, improvements upon their predecessors. It would be a vast improvement if our battle-ships could be constructed with those lofty bows which give to ships of the 'Alexandra' and 'Hercules' type a conspicuous advantage over later models when steaming at speed against a heavy sea. Such an improvement might be realised in a design having a bow- and a central-battery, as in the 'Alexandra.' The disposable weight would be represented by a turret armed and armoured as in the 'Nile' and the 'Trafalgar.' Their great cost, falling little short of 800,000*l.* for each battle-ship of the first class, render it impossible to multiply such vessels beyond a certain limit. It is necessary to turn to smaller types, and of these none would appear to give greater promise than the armoured ram.

United
States
naval
policy

Dealing with a professional topic, it will be more impressive if the views of a layman can be conveyed in language borrowed from members of the naval profession. No Navy has displayed more original genius in construction than that of the United States. In the report of the Secretary for the United States Navy of 1870, the marine ram is alluded to as 'a new element which promises, when constructed upon sound principles, and in forms of special strength for its particular and appropriate service, to be a weapon of most destructive warfare.' The value of rams was specially insisted upon by the Admirals who had commanded during the Civil

War, and who at its close were requested to draw up reports for the guidance of the naval department in relation to shipbuilding. Amongst these experienced sea-officers none perhaps wrote more clearly and more forcibly than Admiral Goldsborough. Arguing that no ship of rational dimensions can support throughout her exposed parts more than a very limited thickness of iron plating, and that the strongest armour can be but of poor account unless other elements of efficiency, and notably that of celerity in turning, are secured, he insists that every ironclad, as a matter of course, should be an exceptionable ram. This she could not be unless capable of being directed with a great degree of promptness to any desired quarter. Velocity was of primary importance; it made the vessel herself a terrific projectile. 'The value of rams,' he said, 'at this moment cannot be overestimated. With a few in each of our prominent commercial ports no enemy could blockade them. Rams intended for purely harbour defence would be better without guns. They themselves would be the projectile, the steam the powder, and the effect of both properly combined would be absolutely irresistible. To fit the rams with guns would swell the cost largely, and so abridge the multiplication.'

Value of
the ram

Turning to the French Navy, the armoured ram was strongly recommended by Admiral Gougeard, the Minister of Marine under M. Gambetta. Admiral Gougeard's design, as described in the 'Engineer,' was intended to be armed with the torpedo as the principal weapon, to have great speed, and to be protected by a steel deck; the floatability being guaranteed by means of cells filled with buoyant material. The type contemplated by Admiral Gougeard is represented in the British Navy by the solitary 'Polyphemus.' A ship for the same purpose

Admiral
Gougeard's
design of
a torpedo
ship

could be designed of a more solid and yet less costly construction. The superstructure could be simplified, the torpedo armament reduced, the thin but expensive armour of Whitworth steel plating being replaced by more solid but less costly armour. That rams alone would not constitute a satisfactory or efficient fleet for the general duties of the Navy will be obvious. Enough, perhaps, has been said in support of a proposal that some vessels of this class should be taken in hand. In combination with our line-of-battle ships armoured rams would be of great value.

Cruisers

Passing to the cruisers, the 'Blake' and 'Blenheim' have been already mentioned. In the construction of vessels of more moderate dimensions, we have to make our choice between various designs recently produced. We have in our own 'Leanders' models of symmetry with great speed. Among cruisers lately built, of comparatively small dimensions, the 'Piemonte,' as described by Lord Armstrong, is a vessel which presents a remarkable combination of armament and speed on a displacement of 2,500 tons. The 'Medea' and the 'Medusa,' now completing for our own Navy, represent a satisfactory design for a swift cruiser of moderate dimensions. Fast cruisers of this type are essential in European waters. The swift sea-keeping torpedo gunboat is a type of vessel most valuable for the purpose of blockade, and as an auxiliary to the heavier ships. We need a large reinforcement of this class.

Construction advocated

To conclude this part of my subject—assuming our normal expenditure on shipbuilding to be on the scale proposed in the address which I had the honour of delivering before the Chamber of Commerce—that is to say, double the amount of the appropriations in the French Estimates, and assuming our expenditure at the

present time to be in round figures three millions annually, equally divided between the armoured and protected classes—our programme of construction should enable us to add every year to the fleet the following list of vessels : 1 battle-ship of the first class, 3 armoured rams, 2 'Blenheims,' 3 'Medusas,' and 8 'Sharpshooters.' The shipbuilding policy for the British Navy must be adapted to the circumstances of the time. It will always be possible, by means of a special effort, to make additions to any particular class of ships in which it is thought that we are deficient. Supplementary Estimates on the one side must be met by supplementary Estimates on the other.

From shipbuilding I pass, by a natural transition, to the administration of those great establishments in which our ships are built. It has been the custom to hold up the dockyard administration to contempt. We have recently had a more favourable opinion, and from an authoritative source. The dockyard expense and manufacturing accounts—those important combinations of figures in which the whole results of the manufacturing operations of the dockyard are built up into a comprehensive balance-sheet—have lately, for the first time, been submitted to the searching audit of the Comptroller-General of the Exchequer. That high authority expresses satisfaction both with the principle on which those accounts are prepared, and with their accuracy in detail. The results of a test audit lately for the first time applied by the Treasury to the store accounts are equally satisfactory.

Dockyard
adminis-
tration

As to the comparative cost of dockyard and contract building, we have the evidence of the Director of Dockyards, who has come fresh to his post after a long and successful career in the private trade of the country.

Cost of
dockyard
and con-
tract work

Asked his opinion by the Committee of the House of Commons on Navy Estimates, Mr. Elgar considered that, as the contractors could build a merchant ship more cheaply, so the dockyard had the advantage in building ships of war. He expressed himself well satisfied with the dockyard workmen both for skill and diligence.

Time in
building

As to the time occupied in building we have achieved immense reform. We have been making steady progress for some years in accelerating construction; but the 'Trafalgar' has eclipsed anything that had before been achieved. It is hoped that she will be ready for the penant next June, or three years and six months from the time when the keel was laid. The British dockyards compare favourably with those under foreign administration. In Italy the 'Duilio' and the 'Dandolo,' laid down in January 1873, were ready for commission in January 1880 and March 1882 respectively. The 'Italia' and 'Lepanto,' laid down in January and September 1876, were ready for commission—the former in October 1885, the latter in May 1888.

French
construction

Turning to the French Navy, the ironclads now in construction—the 'Neptune,' laid down at Brest, and the 'Magenta,' at Toulon, in October 1880—will not be ready for their trial before 1890. The 'Formidable,' laid down at J'Orient, and the 'Amiral Baudin,' at Brest, in December 1878, will be ready for their trials in the present year. The 'Hoche' and the 'Marceau'—the one building in the dockyard and the other by contract—were both laid down in 1880. The 'Marceau' will be ready this year. The 'Hoche' is $\frac{23}{100}$ ths short of completion. The delay in completing in France is more striking still in the case of smaller vessels. Of the four armoured gunboats laid down in 1882, one of 1,640 tons and one of 1,050 tons will be ready this year; another pair, one of

larger and the other of smaller size, will be advanced to $\frac{49}{100}$ ths and $\frac{41}{100}$ ths respectively. The torpedo cruiser, the 'Vautour,' of 1,280 tons, commenced in 1882, was only completed for sea in 1888.

It is difficult to compare the cost of work in the French and English dockyards. In the French dockyards the number of workmen is 21,000, and their average earnings are 40% a year. The number of workmen in the English dockyards is 18,047, and the average earnings exceed 65% a year. With this remarkable difference in the scale of the wages, the cost of building appears approximately the same in the two countries.

In comparing a dockyard with a private establishment we must always keep in view that our establishments are primarily intended to deal with emergencies and for the general purposes of the fleet. There must be a larger expenditure on various services than is strictly necessary to carry out the work of mere building in ordinary times. In late years, more particularly under the present Board of Admiralty, improvements have been effected in dockyard administration. While recognising that much has been achieved, there is still room for improvement. Money is wasted on the maintenance of ships practically useless for the defence of our shores and our commerce in the event of war. The steam basins have been filled with vessels efficient only for peace purposes, in process of refitting at great cost for the relief of other vessels of similar type, which it has been the inherited policy of the Government to keep in commission for the police of the seas. Progress has been made in cutting down the cost of repairs and refits. For a further and considerable retrenchment we must look to a radical reform in the constitution of our foreign squadrons. On the Australasian station and China

French
and
English
dockyards

Labour
on repairs
in dockyards

no material reduction may be possible. On the East Indian station the trying work of the Red Sea, or some portion of it, should be handed over to the Indian Navy. Lascars are better fitted to contend with the climate than crews of Englishmen. Elsewhere the vessels permanently kept on the stations should be reduced. Our flag should be shown, and the Navy should be trained in flying squadrons. A system similar to that so long maintained in the British Service has been followed under the French administration, and it has been most strongly condemned by the ablest naval writers in France.

X

FUTURE POLICY OF WARSHIP BUILDING

PAPER READ AT THE INSTITUTION OF NAVAL ARCHITECTS,
MARCH 18, 1891

IN selecting the naval programme of the future as the subject of the present paper, I have chosen a topic which it is not premature to discuss. The Admiralty at the present time has large resources at its disposal, and the reinforcement of the fleet is being pushed forward with ability and energy ; but the time must shortly come when a further programme of shipbuilding should be considered, and the administration of the day will once more address itself to the difficult task of deciding between the conflicting views of eminent authorities. When it is considered how great is the issue at stake, how large the expenditure involved, how hazardous to lay down ships in batches before a single specimen has been tried at sea, the value of discussion as a preliminary to action will be readily admitted. It was well illustrated in the case of the Royal Commission presided over by Lord Dufferin. Their able report was for many years a leading light for the shipbuilding policy of the Navy. We cannot claim to speak here with the authority of Royal Commissioners, but I shall hope that it may be of some service to the Admiralty that the construction of the future should be debated by the Institute of Naval Architects.

Necessity
for discussing
future
programme

'Hamilton'
programme

As a preliminary remark I desire to say that if I do not propose a programme, in all its features identical with that now in course of execution, and which may be appropriately designated the 'Hamilton' programme, it is certainly not my intention to imply criticism or disapproval. Happy in their opportunity, the present Admiralty resolved to bring up the strength of the Navy to the level of the country's requirements; and in the selection of types they wisely went beyond their immediate advisers to the officers who, by their recent experience in the command of fleets, were the best qualified to give counsel to the administration.

Twofold
duty of
Navy

In considering the programme of future construction, it is essential to keep clearly in view the twofold duty of the Navy:

I. Defence against invasion.

II. Protection of commerce.

Captain Mahan, in his admirable volume, lays it down that 'the enemy's warships and fleets are the true objects to be assailed on all occasions.'

Best means
of defence

The defence of the Empire from invasion will be best secured by placing British squadrons in face of the enemy wherever he may be. By this offensive defence we bar the only possible line of attack in the most effective way. To use words quoted by Captain Cleveland from Lord St. Vincent, we must 'beard the lion in his den, and never relax the grip.' It has been laid down by eminent naval authorities that, in order to blockade successfully, the force outside must be double the force inside. The blockading force should include torpedo gun-vessels for the inner line, cruisers for the second line, and battle-ships for the outer squadron. The proper complement of store and torpedo depôt vessels must be provided.

What are the operations by which the Navy should give protection to British commerce ?

(a) The Navy must sweep the English and Irish Channels and their approaches, and guarantee security over the entire space included between the coasts of Ireland and the Peninsula. The cruisers for this work may be of moderate dimensions. The 'Apollo,' 'Medea,' and 'Pallas' classes, forming part of the Hamilton programme, provide a large instalment of the vessels required for this important service.

(a) Command of sea to Cape Finisterre

(b) As the range becomes wider, protection must be given, in the open ocean, by patrol ; in narrower seas, by convoy.

(b) Patrol in ocean

In war the Atlantic trade will not be the principal care of the Navy. We may anticipate a considerable temporary transfer of tonnage to the flag of the United States. 'England's extremity,' as Sir Charles Dilke has pointed out, 'would be America's opportunity . . . the greater portion of our commerce will pass in case of war under the American flag. High prices would attract American enterprise ; the United States would cover with the stars and stripes an immense food traffic ; and the fleets that were "investing" us would have to meet the combined energies of the British Empire and of the republic.' The ships which will remain under our national flag will be secured from the risks of capture by their superior speed.

Probability of transfer to neutral flag

It is on the route to the East and to South America that British commerce will most need the protection of the Navy. It is a fatal objection to the use of the Suez Canal in war that it can be easily blockaded by operations which it would be impossible to prevent so long as it was permitted to remain open to trade. To close the Canal, and by the action of the Navy prevent a hostile

Protection of commerce to East and South America

occupation of Egypt on the outbreak of war, is the policy most consistent with a true view of British interests. We stand prepared to contend for the supremacy of the seas in the Mediterranean as elsewhere ; but in the view of many naval authorities, on the outbreak of war, the route to the East will be *vid* the Cape. The tracks along which all ships must travel must be defined by Order in Council, and should be traced, as Captain Cleveland has suggested, at the greatest practicable distance from any ports which might be used by an enemy's cruisers. Long distances separate the fortified coaling stations on the Cape route, and efficient cruisers for the protection of our trade on that route must have high speed, great coal endurance, and be capable of keeping the seas for extended periods. They must, therefore, be of large dimensions.

East

From Ceylon to the Straits and thence up the China Sea, the distances to be traversed from coaling station to coaling station are sensibly less, while the number of ports in which hostile cruisers could lie perdu is such that we cannot entirely rely upon the method of protection by patrol. Between Singapore and Shanghai the Navy should be prepared to give escort to convoys starting at frequent intervals. The older ironclads, with improved coal endurance, and the protected cruisers of the 'C' class, might be efficient for this duty.

Capture
of enemy's
coaling
stations

Having indicated the nature of the duties which might be efficiently performed by the older ironclads, it may be observed in passing that it would be an obvious operation of war for a fleet of ironclads, when sent out to Eastern waters, to attack and take possession of any hostile coaling stations on the line of communication. If this were done, India would be secure. The capture of his coaling stations would make it impracticable for a hostile

Power to send ironclads from European ports to attack Bombay.

The trade with South America, from a rendezvous off St. Paul's to the River Plate, should be conducted by convoys similarly escorted.

South
America

In considering the programme of the future we must have regard, not only to naval requirements, but to political and financial considerations. The Admiralty has properly recognised that it cannot demand unlimited sums from the Treasury. It has been officially announced that it is the policy of the present Government to keep the British Navy at a standard of strength at least equal to any other two Powers combined. Looking to the rapid transitions which are taking place in the instruments and methods of naval warfare, I take no exception to the standard proposed, so far as relates to ships for the line of battle and their auxiliaries. For cruisers, the measure of our requirements must be drawn rather from the tonnage to be protected, and the increased difficulty of maintaining a strict blockade, than from a comparison with other Powers as to the number of ships on their Navy lists.

Programme
of future

At this stage it will be necessary to submit some comparative statements. In recent volumes of the 'Naval Annual' tables have been published showing the relative strength of England, France, and Russia, in the various classes of armoured and unarmoured ships. In the present paper these tables have been brought up to date, the principal authority consulted being the issue for 1891 of the well-known Austrian Almanack. It will be sufficient for the purpose of a general comparison to give the total number of ships and their aggregate tonnage in the several classes.

Comparison
of relative
strength

All comparisons are most difficult, and open to

Difficulty
of com-
parison

destructive criticism. As a general rule, as between ships of approximately even date, the relative fighting efficiency varies as the tonnage. It must be presumed that the naval architects who enjoy the confidence of the administrations of the great Powers, are equally skilful in obtaining the best results for a given displacement. Every ship is a compromise. In one case more importance may be attached to protection, in another to speed and coal endurance, in a third to armament. All these elements are of value, and, as we cannot know beforehand the nature of the service on which vessels may be employed, it is impossible to determine with precision their relative importance.

BATTLE-SHIPS

First Class

England	. . .	32 ships, aggregating	354,950 tons
France .	. . .	14 " "	151,682 "
Russia .	. . .	6 " "	57,617 "

Second Class

England	. . .	13 ships, aggregating	89,000 tons
France .	. . .	13 " "	98,101 "
Russia .	. . .	4 " "	21,172 "

AUXILIARIES TO BATTLE-SHIPS

I.—Look-out Ships

Number of Ships	Type	Tons	Speed
ENGLAND			
2	Iris	3,730	Knots 18
2	Barham	1,830	19½
4	Barrosa	1,580	16½
11	Archer	1,770	17
FRANCE			
2	Fleurus	1,310	18
4	Condor	1,240	17

FUTURE POLICY OF WARSHIP BUILDING 361

AUXILIARIES TO BATTLE-SHIPS (*continuea*).

II.—Torpedo Gun-vessels

Number of Ships	Type	Tons	Speed
ENGLAND			
1	Polyphemus . . .	2,640	Knots 18
15	Sharpshooter . . .	735	21
4	Rattlesnake . . .	525	19
FRANCE			
2	Not named . . .	850	—
5	Leger . . .	450	19
8	Bombe . . .	320	18

COAST DEFENCE AND THE INSHORE SQUADRON

England . . .	12 ships, aggregating	47,720 tons
France . . .	23 " "	83,727 "
Russia . . .	24 " "	58,374 "

ARMoured CRUISERS

England . . .	18 ships, aggregating	137,050 tons
France . . .	12 " "	63,446 "
Russia . . .	8 " "	63,223 "

PROTECTED CRUISERS

First Class

England . . .	11 ships, aggregating	85,550 tons
France . . .	6 " "	29,779 "
Russia . . .	1 " "	5,000 "

Second Class

Number of Ships	Type	Displacement	Speed
ENGLAND			
24	Apollo . . .	Tons 3,400 to 4,360	Knots 19½ to 20
3	Medea . . .	2,800	20
2	Marathon . . .	2,950	19
9	Pallas . . .	2,575	19
4	Mersey . . .	4,050	18
4	Amphion . . .	4,300	17
FRANCE			
6	Cosmao . . .	1,850	19½
2	Davout . . .	3,027	20
RUSSIA			
2	Rynda . . .	2,950	15

SUMMARY OF SECOND AND THIRD CLASS
PROTECTED CRUISERS

England . . .	46 ships, aggregating	157,505 tons
France . . .	8 " "	17,208 "
Russia . . .	2 " "	5,900 "

Ships for the police of the seas are not included. Our superiority in this class, not perhaps of much value, will be admitted.

Explanation
of tables

A few observations may be given in explanation of the tables. The oldest British ship in the list of first-class battle-ships is the 'Devastation,' launched in 1871. The oldest ships in the French list are the 'Amiral Duperré' and the 'Dévastation,' launched in 1879. The oldest Russian ship is the 'Peter the Great,' launched in 1872.

First-class
battle-ships

In battle-ships of the first class, built and building, our strength, in comparison with that of the two Powers named, cannot be said to fall below the Admiralty standard. We are building ten ships to four of the French Navy, and three for the Russian Navy. This proportion, satisfactory at the present, may be suddenly altered by a decision elsewhere to lay down new vessels and to push their construction vigorously. No abatement of the efforts now being devoted to battle-ships is warranted under existing conditions.

Auxiliaries
to battle-
ships

Auxiliary vessels are indispensable supports for the battle-ships. A writer in the 'Revue des Deux Mondes' fixes the relative composition of the future fleet best suited for naval tactics at twelve ironclads, six cruisers of from 3,000 to 5,000 tons, six gunboats of from 400 to 1,200 tons, and twelve sea-going torpedo boats of from 100 to 150 tons. We are far below our requirements in the auxiliaries to battle-ships. The same observation applies with at least equal force in the case of foreign Powers.

In ships of the second class actually available for service England stands obviously below the standard of equality to a combination of any two Powers. In the near future our relative position will be stronger. A large proportion of the French ships launched between the years 1865 and 1875, having been built of wood, must shortly be removed from the lists. It does not, therefore, appear necessary to give special prominence in the future programme to the construction of second-class fighting ships. It will be sufficient if we give a moderate reinforcement to the fleet in ships possessing the capabilities of the 'Caïman' type of the French Navy for operations in the Mediterranean and in narrow waters.

Second-class
battle-ships

We shall deal later with the repairs of the second-class ironclads.

Turning to the ships for coast defence, in the French list have been included the old wood-built vessels 'Bélier' and 'Bouledogue,' 'Taureau' and 'Tigre,' and the 'Onondaga,' an iron monitor. Eight of the French vessels are armoured gunboats, four of 1,640 tons and four of 1,050 tons. The other French coast-defence ships are beyond comparison more powerful than any ships on the British list. Four have quite recently been laid down.

Coast-
defence
ironclads

The Russian list includes ten monitors and two 'Popoffkas,' all being essentially harbour-defence vessels, and not available for offensive operations.

Our inferiority in coast-defenders is evident.

In the class of armoured cruisers are included, in the British list, six ironclads of the earliest type. Obsolete as battle-ships, they could be adapted at a comparatively moderate cost for the protection of commerce on the distant stages of the ocean highway to the East. In those waters no hostile battle-ships of modern construction are likely to be found.

Armoured
cruisers

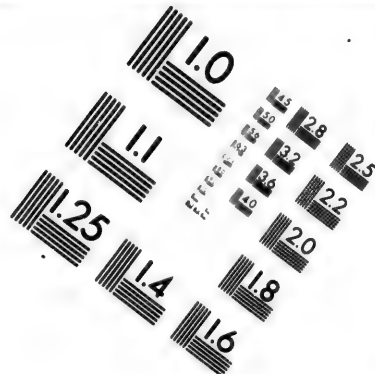
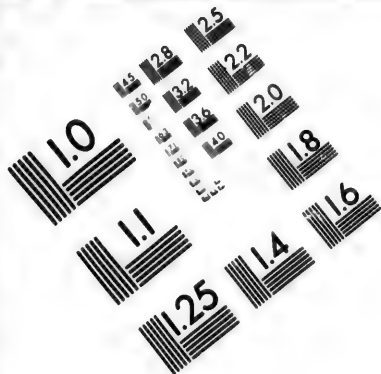
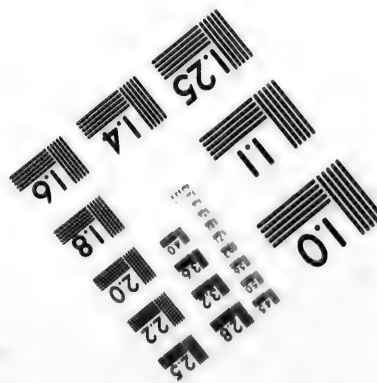
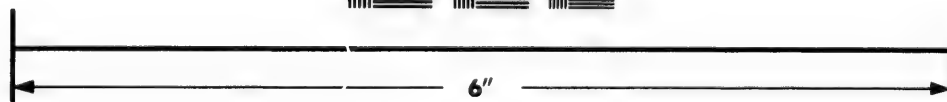
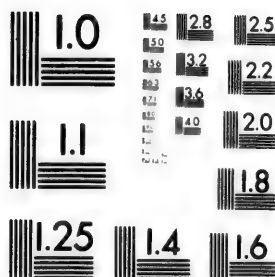


IMAGE EVALUATION TEST TARGET (MT-3)



**Photographic
Sciences
Corporation**

23 WEST MAIN STREET
WEBSTER, N.Y. 14590
(716) 872-4503

25
28
32
22
20

10

Protected
cruisers

In the classification of the cruisers it has been difficult to draw the line between the armoured and protected. All the cruisers in the armoured list are belted. All those classed as protected have an armoured deck. It does not follow that a greater weight has been appropriated to armour, or that the protection is more complete in the armoured cruisers than in the case of the vessels classified as protected. In his description of the 'Blake' and 'Blenheim' in the House of Commons, it was stated by Lord George Hamilton that in our later cruisers the strong protective deck over the vitals, in association with certain novel arrangements for protecting the guns and the guns' crews from shell fire, had been adopted after much consideration by the Admiralty as superior to the usual protection by a narrow vertical belt of moderate thickness.

Cruisers
building

The three lists of cruisers, taken together, show a decided balance in favour of England. In proof of the energy with which the building of cruisers has been pushed in this country, we may compare the magnificent list of ships included in the Hamilton programme with the ships in construction in France and Russia. The French are building the armoured cruiser 'Dupuy de Lôme,' the four 'Charners,' the three protected cruisers of the 'Alger' type, and the five of the 'Davout' type. Russia has the armoured cruisers 'Navarin,' 9,476 tons, 16 knots; and 'Rurik,' 10,000 tons, 18 knots. We are now advancing—and our necessity for the protection of commerce requires it—at much more than double the rate of France and Russia combined. For the German Navy four cruisers of the first class are in construction. Three have a displacement of 5,500 tons, speed 20 knots, two 18-ton, and eight 6-inch guns. The smaller vessel, of 4,800 tons, has a similar speed and armament.

As a preliminary to the consideration of a future programme, it has been necessary to make comparison with foreign Powers. Let us pass on to the consideration of types.

First, the battle-ships. It must be laid down as an axiom that a fleet sailing under the British flag must be prepared to go anywhere and to do anything. Our vessels must be of a type in which life at sea during long voyages will not be intolerable to the crews. They must be in the fullest sense sea-keeping and seaworthy. To fulfil these conditions, ample freeboard is most desirable. A high bow is essential, in order to maintain speed when contending with strong head winds. In height of bow and of freeboard, French designs for first-class battle-ships have had in times past the advantage over their British contemporaries.

In the important quality of speed, we may rest content with 17 to 18 knots on the measured mile, as attained in our latest constructions. Speed will always be of essential advantage in enabling squadrons to accept or decline an engagement, and to choose the distance. In a sea-keeping squadron, under all conditions, and especially in a long chase, coal endurance is hardly less important than speed. If the official expectations were realised, a decided advance would have been made in this element of fighting efficiency. From the statements which have appeared in the Press, it would seem that on practical trial the coal endurance has in many cases proved greatly below the estimate. In the first-class battle-ships of the latest type a coal-supply of 900 tons has been provided. It would be desirable to increase the supply to not less than 1,000 tons. At a cruising speed of 10 knots the coal-supply of the battle-ship should suffice for a distance

Types

Battle-ships

Speed and
coal-supply

of 7,000 knots. This would give a margin, even for a passage across the Atlantic. History repeats itself; and Nelson's pursuit of Villeneuve is an illustration of one of the practical requirements of the operations of naval war.

Armaments

We now come to the armaments. In the main armaments of the battle-ships of the future it is not probable that the ponderous pieces which have of late been mounted on board ship will be included. The objections to monster guns are, the limited endurance, difficulty of manufacture, excessive cost, slowness of fire, length, and hence liability to be struck and possibly disabled, and dependence on hydraulic loading gear, perfect in its working under peace conditions, but too susceptible of injury for the practical purposes of war, and requiring armour for its protection.

Heavy guns

The naval advisers consulted by the Admiralty on the Hamilton programme considered that the heaviest gun for battle-ships should not exceed 50 tons. Admiral Scott places the limit of weight at 30 tons. He stands by the principle that no gun too ponderous to be worked by manual power should be mounted on board ship. A 29-ton gun is relatively cheap, durable, and easy of manufacture. Its power of penetration is equal to 21 inches of iron at a thousand yards, and is sufficient for all practical purposes.

The number of heavy guns which can be carried must depend on the limits fixed for the displacement. A battle-ship should be able to carry at least four 29-ton guns.

Quick-fires

A large appropriation of displacement is now required for the quick-firing armaments. Within the range of an accurate and effective fire from a heavy gun on an adversary in motion, quick-firing guns can pour a

hail of bullets on conning-towers, turrets, and open ports.

The gun positions must be determined by tactical considerations. The battles of the future will probably commence, as at Lissa, with attempts to ram. As the hostile vessels advance, each will endeavour to keep down the fire of the opposing ship by an incessant hail of bullets from the quick-firing and machine guns. The ships will return again and again to the charge until the issue is decided. For such a combat it is essential to carry both main and minor armaments in positions giving the greatest command of fire in the end-on position.

Gun
positions

We have now to deal with the vexed question of protection for the hulls, guns, and crews by armour or other means. The distribution of armour has gone through many phases. Naval architects began with thin armour and a large protected area. The advance in the power of the gun led to increased thickness of armour. As the thickness increased, the area protected was reduced, and reliance was placed on numerous water-tight compartments to be packed with stores or light material or otherwise, and cofferdams. The introduction of projectiles charged with high explosives has rendered it indispensable to return to the system originally adopted, and to protect the upper works of ships with armour of limited thickness but of extreme hardness, capable of exploding shells outboard.

Distribution
of armour

It is impossible to fix the thickness of armour on any certain basis. Armour of the utmost practicable thickness can be penetrated by the big guns, from which the most destructive shells would be discharged. Comparatively thin armour is of extreme value as against quick-firing guns. In actual warfare the protection afforded

Thickness
of armour

has always been superior to that obtained in target-practice, where every condition is in favour of the gun. In the action fought between the 'Huascar' and the 'Shah,' the former vessel, though struck by seventy or eighty projectiles, received no serious injury, although, according to the tables of penetration, the 'Shah's' projectiles should have pierced the armour of the 'Huascar.'

Admitting that any limit is arbitrary, I would submit that reasonable conditions of fighting efficiency in relation to armour would be met by a protection of 12-inch plates at the water-line abreast of machinery, boilers, and magazines, and on the turrets and the conning-towers.

Protection
of minor
armaments

Since the introduction of quick-firing guns, it is no longer possible for crews to stand in the open without some protection. Much ingenuity has been shown in the ships now under construction in the contrivance of shields for the auxiliary armament. Batteries must be protected by side armour; five inches of steel or compound plating would probably keep out 90 per cent. of all save the heaviest shells.

Dimensions

Having dealt with the several elements which collectively constitute the fighting efficiency of a battleship, we have now to consider the limit of dimensions. With every increase of displacement, the naval architect can give more effective armament, stouter armour, a higher and more enduring speed, more ample coal-supply. On the other hand, if dimensions can be kept within a margin of say 10,500 tons as against 14,000, the same tonnage will give eight ships against six. There are few admirals who would not make some sacrifice in individual power for a decided advantage in numbers. No increase of displacement will guarantee invulnerability against the ram or torpedo, or strengthen the means of

defence against the attack of a puny assailant under cover of fog or darkness. No practicable thickness of armour is impenetrable. Captains of ships and captains of guns must under all circumstances be exposed. In the 'Huascar's' conning-towers three commanders were slain in half an hour. The best disciplined and most valorous crew must be paralysed, at least for a few moments, and possibly in the very crisis of an engagement, by the loss of their commander. It is a further argument against the big vessels of deep draught that the number of harbours which they can enter is small, that they must keep in the offing on many coasts, and cannot pass the Suez Canal.

The arguments for increasing numbers by insisting on some limits of dimensions and cost, as against the policy of building fewer ships of greater individual perfection, have been admirably put together in a paper recently issued from the Naval Department at Washington: '. . . The process of reaching perfection is an experimental one, and is accompanied by many mistakes. The lack of important naval battles in recent years stands in marked contrast to the desperate efforts of European Powers to equip extraordinary vessels designed to combine the invulnerable and the irresistible; and to the rarity of great sea fights may be indirectly attributed the superabundance of types, for we cannot but believe that a war of moderate duration between first-class naval Powers would speedily settle such vexed questions as the utility of the wholly armoured water-line *versus* the citadel ship, and would fix irrevocably the status of such craft as the "Esmeralda" and the "Giovanni Bausan." Such a war would doubtless demonstrate that the elaborate schemes of fleet tactics, which have been the theme of many essays by naval officers, have been

Advantages of numbers

Opinion in United States

chiefly valuable as a mental exercise ; and that although much importance may attach to a skilful disposition of forces in the beginning of an engagement, yet in view of the rapidity with which vessels would be disabled by the tremendous means of offence antagonised, and the inability to see or obey signals amid the confusion and obstructing smoke, it is evident that such an engagement must presently become a pell-mell scrimmage. Such a war, or one such battle, would prove what has long been the apprehension of intelligent officers, that the warship of our day has become far too complicated for the people who may be called upon to work her ; and that a balance of advantage, unsuspected by many, rests with that vessel which has comparative simplicity, even though it be concomitant with a greater exposure of life, a lower speed, and reduced powers of offence.'

Construction
in progress
abroad

In the perplexity of mind induced by conflicting arguments and theories, we may perhaps find some guidance for ourselves in the construction in progress elsewhere. The vessels most recently ordered by foreign administrations include the following :

		Tons
Germany . . .	{ 4 Battle-ships, displacement	10,000
	{ 4 Coast-defence ships, "	3,495
Russia . . .	{ 1 Battle-ship, "	10,480
	{ 1 " "	10,000
	{ 1 " "	9,000
France . . .	{ 3 Battle-ships, "	12,000
	{ 1 Battle-ship, "	11,000
	{ 4 Coast-defence ships "	6,600
Italy . . .	4 Battle-ships, "	14,000
United States . .	4 " "	10,000

In United
States

In the United States the designs for the armoured ships have received most careful consideration, both from the Policy Board and the Navy department. The Americans are untrammelled by traditions, or by the possession of a numerous fleet not of the latest type.

They have always shown themselves bold and ingenious inventors, and in their close observation of what is going forward abroad, and their readiness to copy whatever commends itself to the judgment of the very able officers of their Navy, they belong essentially to the eclectic school of naval constructors. It is well to take note of the decisions resulting from their latest deliberations.

The Policy Board have laid down the following standards for the dimensions of the several classes : Dimensions

First-class Battle-ship, of great coal endurance	}	displacement	Tons
First-class Battle-ship, of limited coal endurance			10,000
Second-class Battle-ship, 4,600 knots at 10 knots	}	"	8,000
Third-class Battle-ship, 4,600 knots at 10 knots			7,100
		"	6,100

The Secretary of the United States Navy proposed the following programme to Congress :

10 Battle-ships of 10,000 tons
8 " " 8,000 "
12 " " 7,000 "
5 " " 6,000 "

As stated in the American 'Army and Navy Journal,' Congress has approved the immediate construction of three ships of 10,000 tons.

The policy adopted in Italy is vindicated by its authors on the ground that, as their country is unable to vie with others in the amount of tonnage constructed, it is necessary to secure the utmost development of power in a limited number of ships. The building of ships of extreme dimensions is of doubtful expediency, even for Italy, where only one ironclad on an average is completed in every two years. Italy

France

The larger dimensions recently adopted by the French Navy department have been severely criticised by M. Weyl, and by naval officers of the school of Admiral Aube.

Compiler's
opinion

In view of all the considerations which have been urged, I shall hazard the opinion that the dimensions of the battle-ship of the future should not exceed 10,500 tons, nor should the cost exceed 600,000l.

'Barfleur'
and
'Centurion'

In the 'Barfleur' and 'Centurion,' now building, armed with four 29-ton guns and an effective minor armament, with a speed of 18 knots, and much protection by armour, we have a design which gives to the nation as good value for the cost as, under existing conditions, it seems practicable to secure. Ships of these dimensions offer an advantage, not easily to be measured, over costlier types, in the larger number which can be built for the given expenditure.

Auxiliaries
to battle
ships

From the battle-ships we pass to their auxiliaries, the look-out ships, torpedo gun-vessels, armoured rams, floating gun-carriages for bombardment, and torpedo carriers.

1. Look-
out ships

As look-out ships, attached to a fleet operating in the Mediterranean, on the coasts of Europe, and in the Channel, we have efficient types in the cruisers of the 'Pallas' and 'Medea' classes. In look-out ships speed is essential, armament subordinate. In the new ships it has been wisely decided to carry a lighter armament. The 'Archer' class, the immediate predecessors of the ships building under the Hamilton programme, are overcrowded with men, guns, torpedo tubes and machinery. Relieved of some of their load they would be more efficient for their special duties. For our 32 first-class battle-ships we require at least 64 look-out ships: we have 19 on our Navy List.

As auxiliaries to the battle-ships, torpedo gun-vessels are not less indispensable than the look-out ships. In open daylight a battle-ship, using smokeless powder, would probably be successful in warding off an attack by torpedo boats. At night, as a weapon of surprise, the torpedo boat is a formidable assailant. A fleet cannot undertake to blockade, or even to mask a hostile port, without the protection of a large flotilla of sea-keeping torpedo gun-vessels. Within a limited radius these vessels would be efficient as look-out ships. Torpedo gun-vessels should have a high speed, and an armament of quick-firing guns. By increasing the displacement to 735 tons, we have produced a successful type. The French contemplate building vessels of 850 tons, and the limit will probably be found at 900 tons. It will be necessary to push on the construction of torpedo gun-vessels of the most approved types.

2. Torpedo
gun-vessels

In recommending expenditure on the ironclads of the early types, I do not look for much support from the professional naval architects of this Institution. The desire is natural to devote all the money available to push forward the construction of ships of the latest designs. With greater confidence I will make an appeal to the naval officers—Associates of this Institution—who would form an entirely independent opinion as to the best manner in which to apply the public money available for the building and maintenance of the fleet.

Expenditure
on older
ironclads
recom-
mended

The superior foresight and ability with which the work of armoured construction was begun in this country have given us a fleet of ironclads of the earlier types, considerable in numbers, and still, I would contend, of substantial value. It is surely of great advantage to the British Navy that while the earlier ships built by foreign Powers are beyond repair, their British contem-

poraries, though obsolete in machinery and armament, are as sound in hull as when they were first launched. In the distribution of armour these older vessels approach much more nearly than do their successors to the requirements which the introduction of quick-firing armaments and highly explosive shells has improved. The 'Alexandra,' 'Hercules,' the 'Achilles,' and 'Audacious' classes are noble ships, and are well worth fitting with modern machinery and armaments. With powerful and economical engines, and a good armament of light and quick-firing guns, the earlier ironclads would be of the greatest value for the protection of our trade in the farthest East by the method of convoy. I should deplore a final decision to abandon the 'Sultan' to decay.

Coast
defence

We have now to deal with coast defence. The flotilla for this purpose should include rams, monitors, and armed torpedo vessels of the 'Polyphemus' type improved. For coast and harbour defence a torpedo flotilla has been proved to be in a high degree effective. Seven ironclads and eleven other vessels were sunk by defensive torpedoes during the American War of Secession. In the war with Paraguay the Brazilian ironclad 'Rio de Janeiro' was destroyed by similar means. During the Russo-Turkish war the Turks lost a gunboat and a monitor in the Danube, and a steamer of 1,200 tons at Batoum.

Torpedo
boats

Experience has shown that the smaller torpedo boats are unseaworthy. Those recently constructed in England are of about 100 tons displacement. Germany, Italy, and Russia are building boats of 130 to 160 tons. It will probably be well to have torpedo boats of two classes. The first class, of not less than 150 tons, should be able to cruise with the fleet within a certain distance from the coast. The second-class boats, for harbour defence, may be of small size and cheap con-

struction. In the conditions which favour the attack by the torpedo boat upon heavy ironclads blockading a port, a small and cheap type will be almost as effective as one more costly. Of fifteen attacks with the spar-torpedo, enumerated by Ledieu and Candiat, seven were more or less successful. The same authors mention it as a notable fact that, in all cases of frail construction, no boat armed with the spar-torpedo has yet been destroyed by the enemy's fire.

In proposing the defence of harbours by a torpedo flotilla, I offer no new suggestion. In inviting attention to the 'Monitor' type, I enter on more debatable ground.

The 'Monitor' was designed by Ericson with the view to reduce as much as possible the surface exposed to the enemy's fire. It was capable of floating at a light draught. In the bombardment of Charleston 2,330 projectiles were fired by the forts. The monitors, though struck 256 times, sustained no serious injury, and must therefore be pronounced to have been thoroughly efficient for coast service and harbour defence. With their deck openings properly closed they withstood the fury of raging seas. In the United States the qualities of the 'Monitor' type have always been highly appreciated, and a heavy expenditure has been recently incurred in rebuilding many of the original vessels.

Monitors

For a naval Power which aspires to hold the command of the sea, mere coast-defence ships are not, it will be admitted, an important class. The recommendations of former commissions in favour of building a few defence vessels for our principal harbours have, perhaps, been too long neglected. It seems possible that a future programme might advantageously include monitors capable not only of doing service for defence, but also of acting as part of a fleet blockading an enemy and possibly bombarding his

British
coast-
defence
vessels
must be
seaworthy

ports. Any vessels of the coast-defence class laid down for the British Navy should be seaworthy, and efficient for any service in the Channel and the Mediterranean. A lower speed and more limited radius of action may be adopted than in the case of first-class ships.

French
coast-
defence
vessels

In France, where the shipbuilding policy is framed to meet somewhat different conditions, constant attention has been paid to the coast service and alongshore section of the fleet. Eight armoured gunboats have recently been completed. Four powerful turret-ships, of the 'Valmy' or improved 'Furieux' type, carrying two heavy guns in separate turrets, and having a speed of 17 knots, have just been laid down. Our last addition to the British fleet in coast-defence vessels was made in 1871, when Mr. Goschen's Board ordered the four 'Gorgons.'

Rams

The power of the ram when successfully applied has been shown in the destruction of the 'Ré d'Italia' by the 'Ferdinand Max' at Lissa, and in the disastrous collisions between the 'Thetis' and the 'Reine Blanche,' the 'Iron Duke' and the 'Vanguard,' and the 'König Wilhelm' and 'Grosser Kurfürst.' The officers of the American Navy who served in the War of Secession were deeply impressed with the value of the ram. In the narrow waters in which their actions were fought it was sometimes used with great effect. The American Board of Naval Policy recommended a ram with a displacement of 3,500 tons. The Navy Department has produced a design, now in course of construction, of 2,050 tons displacement, heavily armoured, no armament, speed 17 knots.

'Poly-
phemus'

Our 'Polyphemus,' simplified and cheapened, offers a type which we have unaccountably neglected. The French are building two torpedo rams considerably smaller than the 'Polyphemus.' We should build rams of a type which should not only be adapted for coast and

harbour defence, but efficient for service with a sea-going fleet.

We have now to consider our future programme of construction in the cruiser class. The protection of British commerce can only be effectively performed by building cruisers which shall have a superiority over the ships of other Powers in all that constitutes sea-worthiness, ability to keep the sea, and fighting efficiency. It is not with 'Archers' and 'Bellonas,' but with our 'Blakes' and 'Edgars' that we must patrol long stretches of sea. The high authority of Mr. White may be claimed in support of a policy of building cruisers of large dimensions. In a paper read last year at this Institution he insisted strongly on the advantages of size in relation to enduring speed in open water, coal-supply, steadiness of gun platform, power of concentrated attack, and protection; and while contending for the utility to the Royal Navy of the smaller vessels, he fully admitted the necessity of large ships for ocean service. Mr. White has given practical expression to this view in the noble design of the 'Blake' and 'Blenheim.' In the 'Warspite' and 'Impérieuse' we hit upon a good type, which it would be desirable to reproduce, with certain improvements. The armament of 6-inch guns should be increased, retaining two 9-inch or 8-inch guns. The battery should be protected by 4-inch armour, and for this purpose some reduction of the armour protection on the belt might be accepted. The seagoing qualities would be improved by raising the bow and giving more sheer.

In the recent designs for our cruisers the ingenuity of the constructors has been unduly taxed by limitation of tonnage. It has been sought, by the use of forced draught, to raise the indicated horse-power beyond any standard which had previously been attained with the

Cruisers

Causes of
breakdown

same weight of machinery. The effort has resulted in numerous failures. Machinery has broken down, and an unprecedented disparity has been experienced in the speeds at sea, as against those attained on the measured mile. The British Navy by no means stands alone in this experience of disappointment.

In the ships of the mercantile marine, which have to contend with ocean weather at all seasons, it has never been attempted to rival the Royal Navy in the ingenious efforts to secure economy of weight.

Weight of
engines
deficient

In our mail steamers on the Atlantic the weight of machinery per I.H.P. is about 280 lbs. ; in cross-Channel high-speed steamers carrying no deadweight cargo it runs about 270 lbs. per I.H.P. ; and in cargo steamers of modern design as much as 440 lbs. per I.H.P. The weight of machinery in the Royal Navy varies considerably. In the 'Inflexible,' a battle-ship twelve years old, the total weight of machinery per I.H.P. is 430 lbs. ; in the 'Howe,' a first-class battle-ship of the 'Admiral' class, it is 220 lbs. ; in the 'Victoria,' another battle-ship, 170 lbs. ; in the 'Sardegna,' an Italian ironclad recently launched, 178 lbs. ; in the 'Medusa,' 161 lbs. ; in the 'Sandfly,' a first class gunboat, 82½ lbs. ; and in first-class torpedo-boat engines it is about 60 lbs. In the Navy, machinery has been crammed into confined spaces. It has been regarded as essential that the engines should be kept below the water-line. Hence the horizontal cylinders and short connecting rods. In our later cruisers an important improvement has been introduced. Relying on the protection afforded by the armoured deck, inverted cylinders with longer bearings have been accepted, with highly satisfactory results.

Excessive
armament

While too little weight has been allowed for the machinery of our cruisers, the smaller types have been

burdened with an armament more powerful than is required for the light skirmishing, which alone could be attempted in vessels of the lightest scantling, easily sinkable by a single shot. In cruisers superiority of speed and coal endurance are the primary qualities. In the armament of the cruiser the heavy gun of the battleship should have no place. A protected cruiser can never engage an ironclad on even terms. The weight absorbed in the 15-ton guns and their mountings of the 'Mersey' class might possibly have been better applied in giving more protection to lighter guns. In the French Navy the heaviest guns carried in cruisers are of 5 tons for the protected, and 8 tons for the armoured classes. Our Admiralty has wisely decided to substitute two 5-ton guns for the 22-ton gun originally proposed to be mounted in the bow of the new first-class cruisers of the 'Royal Arthur' class.

Balloons, as fitted by the French to their ironclad 'Formidable,' are among the newest additions to the equipment of fighting ships. Ascents have been made to a height of 2,000 yards. Elevations of from 220 to 330 yards have been easily attained. By this novel application of aerostatics the horizon line can be extended from 8 to 25 miles. It will be necessary to give to our fleets this valuable addition to their fighting efficiency.

In the Navy opinion sets strongly against the retention of sails for all classes. In the ironclads heavy masts and yards have been retained too long, and the hopeless struggle to combine sail-power with steam has sometimes, as in the case of the 'Inflexible,' the 'War-spire,' and the 'Impérieuse,' been carried to the extreme. In ships of the 'Blake' and 'Edgar' types, propelled by two screws, canvas can be of comparatively little practical value. In the narrow seas it is not required. On the

Balloons

Retention
of sail-
power

broad ocean all cruisers under 5,000 tons should carry sail. The rig should be contrived with the view to rapid preparation for action. It is worth noting that in the United States Navy sails are retained for cruisers of the latest types. There is reason to believe that the coal endurance of Her Majesty's ships is usually overestimated in the official figures. No allowance is made for the consumption of fuel for general purposes, for the difficulties of stowage in inconveniently shaped bunkers, or for the inferior qualities shipped abroad. Thus, the coal endurance in the 'Mersey' class, officially given at 8,000 knots at 10 knots, was proved, on the outward passage to the Pacific, to be less than 4,000 knots. Similarly the coal endurance of the 'Warspite,' the flagship on the Pacific station, has been proved to be under 5,000 knots, as against the 7,000 of the Admiralty legend. Vessels of such limited coal-carrying capacity, and without the means of cruising under sail or of using supplementary sail-power, are unsuitable for the Pacific station. If sail-power is abandoned, the coal endurance of cruisers should not be less than 10,000 knots at 10 knots. For the police of the seas in the Pacific, the corvettes of the 'C' type, which can go round the islands under sail, are more serviceable than the later vessels, with more speed but dependent entirely on steam.

More
first-class
cruisers
needed

In concluding these observations on cruisers, I would press most strongly the necessity of a large reinforcement to the Navy of first-class cruisers of the 'Blake' and 'Blenheim' and 'Edgar' types. The necessity for the smaller class is obvious, but our requirements have for the present been largely provided for under the Hamilton programme.

Mercantile
auxillaries

As an early advocate of the policy of giving subsidies to mercantile auxiliaries, I rejoice that a decided step in

this direction has been taken by the present Government. I would urge that attention be steadily directed to the ships in course of construction for the mercantile marine. All suitable ships should be enrolled in the list of our auxiliary cruisers. In the case of two ships recently selected as auxiliaries to the fleet—the one belonging to the Transatlantic Line, and the other to the North German Lloyd Company—the German Government have shown an example which merits our imitation, in the completeness with which every detail of an efficient armament for a merchant cruiser has been considered.

We opened with a comparison of strength in ships built and building of the several types which are efficient for war. We may conclude with a comparison of expenditure.

The total amount available for new construction for the French Navy in 1891 is given by M. Weyl in his analysis of the Estimates at 2,400,000*l*. In the recent debates in the French Chamber, M. Barbey, the Minister of Marine, announced an increase of expenditure for 1892 amounting to 400,000*l*. For the British Navy the amounts available for shipbuilding—new constructions—were :

Comparison
of ex-
penditure,
England
and
France

1890-91	£ 6,777,666
1891-92	6,351,360

Having regard to the comparative situation, as we have found it upon a careful and impartial examination, it will not be safe materially to reduce the expenditure on shipbuilding until the protection of our commerce has been more fully assured. In suggesting a programme for the future, I shall assume that in the five years ensuing upon the completion of the Hamilton programme

expenditure must be maintained not far below its present level.

Necessity
for ships
of different
types

In framing a shipbuilding programme for the British Navy it is necessary to provide for strengthening the fleet in vessels of every serviceable type. Such a policy was well described by Signor Morin in the recent debates in the Italian Parliament. The views advocated by Signor Morin met with the warm approval of Signor Brin, the present Minister of Marine in Italy. 'Signor Morin,' he said, 'has enumerated with great clearness the various theories which have been held in recent years with regard to the composition which should be adopted for the formation of our fleet, and he has shown that these theories are erroneous because they are too exclusive, and are founded on hypotheses which would never be realised in actual war.

Signor
Brin

'A few years ago torpedo boats were supposed to be capable of destroying everything afloat ; and I remember that when I was called to the Ministry of Marine for the second time and proposed the building of several ironclads, many people deplored my leaning towards these large vessels, which would be destined to be demolished by torpedo boats. And this opinion was held, even more strongly than in Italy, by most influential men in other neighbouring countries.

'Later on public opinion became favourable to cruisers, and nothing but cruisers were wanted.

'I fully share Signor Morin's opinion that the eclectic system which we have adopted of composing our fleet of vessels of various types, and of endeavouring to make each type as perfect as possible, is the best solution ; and I see with pleasure that this is no longer disputed by anyone. It is certain that the eloquent and per-

suasive speech delivered by Signor Morin will still further strengthen public opinion in this respect.'

As a five years' programme, I would propose 10 battle-ships, 6 armoured coast-defence vessels, monitors; 6 armoured rams, 'Polyphemus' type improved; 40 cruisers of the first class, 30 look-out ships, and 50 torpedo gun-vessels.

Compiler's
suggested
programme

And now let us briefly consider the strength of the Navy upon the completion of the Hamilton programme and the further programme shadowed forth to-day.

We shall have 42 first-class battle-ships and 7 armoured rams, attended by 49 look-out ships and 70 torpedo cruisers. For the defence of the Channel and our coasts we shall have 18 coast-defence ironclads and a torpedo flotilla. For the protection of commerce we shall have—

- 13 second-class battle-ships,
- 18 armoured cruisers,
- 51 protected cruisers, first class,
- 46 " " second and third class,
- 11 ships, 'C' class.

The force might be thus distributed. We might retain in the Channel, and the area to the south-west of the Channel, into which the trade from the East and the Americas converges, the 9 armoured cruisers of the new type and the 46 second- and third-class cruisers. The new first-class protected cruisers would protect the trade route to the East, from south of the latitude of Gibraltar and round by the Cape to Ceylon. From Ceylon to Bombay and Calcutta, and eastwards to Shanghai, the trade may be formed into convoys. For their escort we shall utilise the 9 armoured cruisers of the old type, the 13 second-class battle-ships, and the corvettes of the 'C' class.

Distribution
of force

Such a force may not be adequate for every possible emergency ; but it would be beyond comparison superior to anything which could be brought against us, and behind it we should have the immense resources of our merchant service and our great industries, the alliance and co-operation of the Colonies, and the patriotic spirit of a great nation, which is instinctively maritime.

Necessity
for adequate
preparation

In conclusion, I regret that I appear as the advocate of a heavy expenditure on naval defence. Our necessities have been created chiefly by the policy of other Powers, who are making preparations to take the offensive if the occasion should arise. The splendid enterprise of our seamen and our merchants involves expenditure on the Navy. Year by year our shipping bears an increasing proportion to the aggregate tonnage of the world. Property of a value exceeding 150,000,000*l.* is always afloat under the British flag. To create a trade of enormous magnitude, and to make no adequate preparation to defend it, would be to invite attack and to expose ourselves to humiliation.

The policy of this country is not a policy of aggression. More and more it is becoming a policy strictly defensive, dictated not by ambition to extend territory, but by the solicitude natural to a mother country to keep touch with the Colonies which it is her pride to have created, and which she is anxious not to lose. Such a policy is essentially a policy of peace ; and a strong Navy is its least costly and surest guarantee.

INDEX

TO

THE FIRST VOLUME

- 'ABYSSINIA,' 114, 198
- 'Achilles,' 199, 209, 236, 247
- 'Active,' 201, 252, 260, 261, 263
- 'Admiral San Bon,' 235
- Admiralty, the: changes introduced by Mr. Childers, 2-5; under Mr. Goschen as First Lord, 6; general organisation of, 6, 16, 24, 54, 55; the constructive departments, 16, 17, 21, 22, 54, 55, 71-73; French opinion on, 71; the Council of Construction, 72, 73; responsibility of with regard to the Navy, 86, 101
- Admiralty administration: the Navy, 141-172; the dockyards, 16-25, 65-81, 170, 353; defence of coaling stations, 135-139, 168, 170; the merchant cruiser reserve, 158-160, 229; shipbuilding, 23, 35, 45, 123-135, 141, 146, 213, 252, 346, 355, 356, 359
- 'Agamemnon,' 110, 114, 121, 150, 166, 194, 316
- 'Agincourt,' 7, 11, 199, 209, 236
- 'Ajax,' 100, 110, 114, 121, 122, 149, 150, 166, 194, 316
- 'Alabama,' 37, 40, 53, 63, 264
- 'Alacrity,' 169, 175, 201
- 'Alarm,' (United States torpedo vessel), 51; description of, 267
- Alcester, Lord, 191
- 'Alexandra,' 109, 121, 166, 195, 218, 253, 348, 374
- Alexandria, bombardment of, 82, 83
- 'Amazon,' 295
- American liners, 52
- 'Amethyst,' 261; in action with the 'Huascar,' 328, 332
- 'Amiral Baudin,' 96, 110, 113, 166, 194, 352
- 'Amiral Duperré,' 100, 109, 121, 163, 166, 189, 194, 362
- 'Amphitrite,' 61
- Anchor Line, the, 271
- Anderson, Mr., on Admiralty administration, 53, 54, 55
- 'Anson,' 114, 124, 137, 138, 166, 194, 222
- 'Ariadne,' 254
- Armaments. *See* Cruisers, Iron-clads, &c.
- Armour: excessive thickness required to resist modern artillery, 7, 44; its value as a protection against guns, 276, 278, 283, 284, 313, 335; advantages of inclined armour, 328, 329; restriction of to vital parts of ships, 334; thickness, weight, and disposition of, 33, 88, 95, 103, 109, 110, 129, 149-152, 166, 167, 275, 279, 306, 307, 318-320, 334-337, 343, 344
- Armoured cruisers, list of (1889), 199. *See* Cruisers, belted
- Armour-plates, material for, 338
- Armstrong, Lord, 250

- Armstrong, Sir William, on the vulnerability of ironclads, 320, 321
 'Astrea,' 237
 'Audacious,' 110, 121, 167, 195, 281
 'Aurora,' 199, 223, 297
 Australian colonies, the, and naval defence, 107, 170
 Australian station, average loss by desertion on the, 58
 Austria, armoured tonnage in 1884, 99
- 'BACCHANTE,' 201, 250, 252, 260, 266, 302
 Baird, Admiral, on the armament of cruisers, 345
 Baker, Sir Samuel, on defence against torpedoes, 323, 324
 Balfour, A. J., 138
 Balfour, Gen. Sir George, 139
 Balloons supplied to ironclads by the French, 379
 Barbey, M., 381
 'Bardleur,' 189, 234, 372
 'Barham,' 174, 204, 224, 211
 Barnaby, Mr., on dockyard management, 17; on defence against the attack of rams and torpedoes, 50, 322, 323; on the Navies of England and France, 112, 113, 114, 132; on the importance of speed in ships, and its relative cost, 248-250; on the policy of building large ironclads, 277, 291, 308, 318
 Barnaby, Sir Nathaniel, 152
 Barnes, Mr. (Surveyor of Dockyards), 66, 175, 193
 Battleship of the future, best type for, 365; speed and large coal supply essentials, 365; size, number, and position of guns, 366, 367; distribution and thickness of armour, 367, 368; the protection of minor armaments, 368; the question of dimensions, 368; foreign opinion and policy with regard to dimensions, 369-372
 'Bayard,' 110, 121, 167, 199
 Beaconsfield, Lord, quoted, 171
 'Bélier,' 196, 363
 'Belleisle,' 110, 121, 167, 197, 208
 'Bellerophon,' 27, 195, 247, 335
 'Bellona,' 174, 204, 211, 224
 Belted cruisers. *See* Cruisers, belted
 'Benbow,' 114, 122, 137, 158, 166, 194, 222
 Beresford, Lord Charles, 192, 208, 209, 215, 220
 Bermuda, defence works at, 168
 Bernadotte, General, 39
 'Black Prince,' 199, 209, 218
 'Blake,' 174, 182, 204, 211, 223, 347, 350, 364, 377
 'Blenheim,' 174, 182, 204, 211, 223, 347, 350, 364, 377
 Blockade, composition and comparative strength of force necessary to maintain, 262, 356
 'Blonde' (renamed 'Shah'), 204, 224, 252, 259
 'Boadicea,' 202, 260, 302
 Board of Admiralty, Committee on (the Duke of Somerset's), 24, 65
 Boilers, duration of, in ironclads and Cunard liners contrasted, 27, 28; protection of, 53, 259, 291, 292
 Bolingbroke, Lord, quoted, 272
 Bombay and Bengal Steam Navigation Company, 13
 Bosphorus, the, 60
 'Bouledogue,' 196, 363
 'Bouvet,' 235, 259; in action with the 'Meteor,' 53, 260
 Brassey, Mr. (the late), 17
 'Brennus,' 113, 196, 207, 222
 Brin, Signor, on the composition of a fleet, 382
 'Britannic,' 339
 British India Steam Navigation Company, 13
 'Brooklyn,' 236
 Burns, Mr. (Cunard line), 27

- 'CAIMAN,' 113, 167, 194
 Calder, Admiral Sir Robert, 2
 'Calliope,' 96, 202
 'Calypso,' 96, 202
 Cammell, Messrs., offer to roll 30- or 40-inch plates, 313
 'Camperdown,' 114, 137, 158, 166, 194, 222
 Cape of Good Hope, completion of a dock at, 106
 'Captain,' loss of the, 8, 9, 53, 317, 340
 'Cecile,' 174, 182, 200, 223, 346
 'Centurion,' 189, 190, 234, 372
 'Cerberus,' 114, 198
 Chamberlain, Admiral, 69
 Channel Fleet, 9, 296
 'Charles Martel,' 113
 'Château Renard,' 257
 Chatham Dockyard, acreage covered by, and number of men employed, 70; extension works at, 106
 Chief Constructor of the Navy, duties and responsibility of, 17, 72; salary of, 73
 Childers, Mr., his policy as First Lord of the Admiralty, 2-5, 9; 74, 75-80; on vessels for the protection of commerce, 251; 306, 332
 Chilian Navy, ironclads for, constructed in English yards, 308
 China station, desertion comparatively rare on the, 59
 'City of Berlin,' 339
 Civil, judicial, and revenue departments of Government, average salaries paid in, 74
 'Cleopatra,' 153, 203
 Cleveland, Captain, 356; on trade routes in time of war, 358
 Clothing and victualling, votes for (1866-67 to 1871-72), 3
 Coal capacity and speed of Cunard steamers and the 'Inconstant' compared, 289, 290
 Coaling stations, defence of, 135-137, 139, 168; expenditure on, 136, 138; the capture of an enemy's in Eastern waters, necessary for the security of India, 358
 Coast and harbour defence: formation of a Reserve suggested, 13; type of vessel adapted for, 43, 50, 60, 337, 374, 375; need of seaworthy ships for, 59, 60; vessels for, in commission or building, 121, 165, 197, 198, 208, 361, 363; mere torpedo-boats limited to, 162; use of rams for, 278, 325
 Coast defences, Royal Commission on, report cited, 50
 Coastguard, the, 57, 142
 Cobden, Mr., his pamphlet on the 'Three Panics' cited, 53
 'Colbert,' 110, 121, 163, 167, 195
 Colbert, Jean, quoted, 107
 'Collingwood,' 88, 98, 110, 114, 122, 138, 149, 150, 152, 166, 194, 222
 Collisions: 'Iron Duke' and 'Vanguard,' 284, 285, 295, 376; 'Thetis' and 'Reine Blanche,' 376; 'König Wilhelm' and 'Grosser Kurfürst,' 376
 Colomb, Captain, on constructing vessels for special services, 52; on the principal object to which marine construction should be directed, 64
 Colonial defences, report of Royal Commission on, cited, 168
 Colonies, the, and naval defence, 107, 170
 'Colorado,' 255
 'Colossus,' 102, 110, 114, 138, 149, 150, 166, 178, 194
 Commerce, protection of, 37-41, 49, 97, 115, 127, 130, 173-175, 209, 221, 236, 255, 268, 288, 292, 338, 377; a special object of attack, 242; class of ships best adapted for its protection, 243-246, 251, 264, 268, 303, 338;

- numbers more essential than speed, 246; measures necessary for, 357-359
- Commercial harbours, protection of, 137
- 'Comus,' 153, 203
- 'Condor,' 169, 200
- 'Connaught' (mail steamer), average speed for six months, 256
- 'Conqueror,' 61, 97, 102, 114, 122, 138, 148, 150, 151, 167, 194
- Controller of the Navy, duties and responsibility of, 18, 21, 22; salary of, 72
- Corry, Mr. (the late), 34, 75, 76; on the size and speed of ships, 248
- 'Courbet.' See 'Foudroyant'
- Cruisers, belted, and protected: description of belted, 130, 131, 150, 152; armaments of, 131, 167, 345; position of the belt, importance of, 344; want of space for the crews, and defect of ventilation, 346; numbers available for coast defence in 1891, 361, 362; essentials for future vessels, 377; causes of breakdown of machinery, 377; excessive armaments of the smaller types, 378
- Cruisers, unarmoured: armaments of, 132, 155, 169, 174, 251, 252, 254, 262, 263, 267, 290, 302; vessels completed, completing, and on the stocks (1889), 200-204, 210; duties of, 221; indispensable for the protection of commerce, 241; class of vessels required for vedettes and sentries of a fleet, 243; relative importance of size, speed, and coal capacity, 243-257, 265, 288-291, 301-303; comparative cost of various types, 250, 252, 259, 261, 266, 268; speedy vessels of moderate dimensions essential for European waters, 250; cruisers for peace duties, 300
- Cunard Company, the, 271
- Cunard steamships, 32, 33, 245, 271, 289, 290
- 'Curlew,' 156
- 'Cyclops,' 7, 197
- Cyprus, landing of men and stores at, in 1878, 57
- DACRES, Sir Sydney, 24, 79
- 'Dandolo,' 61, 115, 121, 313, 352
- 'Daphne,' 202, 225
- Dardanelles, the, 60
- 'Davoust,' 174, 182, 204, 211, 224, 364
- Defence,' 196, 207
- Deptford Dockyard, arrangements made for closing, in 1868-69, 76
- Desertions from the Navy, relative proportion of, at home and foreign ports, 58, 59
- Designing and construction, naval: alterations during construction, 53; French system of obtaining designs, 54; defects in the constructive department of the Admiralty, 54, 55; vessels of the 'Gorgon' class condemned by the Committee on Designs, 59, 60; size of ships: advantages of moderate dimensions, 63, 64; rapidity of construction, 124, 158; armoured cruisers, 89, 96, 97, 127, 130, 131, 152, 344; gunboats, 7, 97, 156, 183, 184, 347; ironclads, 7-9, 48-50, 54, 59-64, 80, 81, 87-89, 100-103, 110, 114, 122-125, 128-130, 144, 145, 148-152, 179, 189, 190, 273-282, 286, 294-296, 300, 305, 313-321, 342-344, 346, 348; rams, 51, 277, 278; torpedo vessels, 51, 97, 105, 115, 123, 126-128, 132, 133, 154, 156, 157, 212, 267, 268, 277, 301, 328; unarmoured ships, 52, 53, 81, 87, 89, 104, 122, 144, 153, 155, 178, 182, 183, 211, 241-272, 288-293, 298-304, 350; repairs, 68, 77, 88; future policy of, see Battleship of the future,

- Designs for ships of war, Committee on, report cited, 48, 49, 60
- 'Devastation,' 7, 37, 48, 49, 52, 109, 120, 150, 166, 195, 274, 319, 362
- 'Dévastation' (French), 100, 109, 121, 125, 163, 166, 194, 362
- Devonport Dockyard, 130, 170
- Devonshire, Duke of (the late), 73
- Dilke, Sir Charles, on the transfer of tonnage to neutral flags in war time, 257
- Dionne, Lebelin de (French ship designer), 260
- Dislère, M., on the minimum thickness for armour plates, 33; on naval construction, 37, 42, 48, 49, 313, 314; on the cost of construction in English and French yards, 100, 101; on the size, armament, and speed required for cruisers, 251, 253, 254, 260, 262, 276; on modern naval warfare, 277, 278, 307; on the speed of ships, 298; on rams and torpedoes, 327
- Dockyard Commissioners' (1860) report cited, 65, 66
- Dockyard economy, Committee on (Admiral Smart's), report cited, 66, 67, 68
- Dockyards: expenditure on, 106; number of men employed and expenditure on shipbuilding and repairs at home and abroad, 1875-76 to 1885-86, 144; wages in, 27, 68, 69, 76, 77, 80, 81, 101, 363; yards at stations abroad, 106, 107, 170
- Dockyards, management of, 16-29; the Admiral Superintendents, 18, 23, 65, 66, 67; master-shipwrights, 17, 18, 20, 21, 23, 66, 67; civil officers, 19, 66; insufficiency of salaries, 19; promotion of workmen, 22; evil effects of concentration of authority at the Admiralty, 22; fluctuations in numbers employed, 62, 68, 75-79, 81, 101; the constructive departments, 65; the naval superintendents, 65, 66, 67; responsibility of officers for estimates, 65, 70; pay and rank of officers, 66-68; chief constructors and chief engineers, 66, 67, 68, 69, 70; extravagance and waste in alterations and repairs, 68, 77; opinions of naval officers, 69; inferior position of constructors, 72; retrenchments under Mr. Corry and Mr. Childers, 76, 77, 78; comparative cost of dockyard and contract work, 351; acceleration of construction, 352; labour on repairs, 353
- 'Doris,' 256
- 'Dreadnought,' 35, 48, 53, 60, 79, 100, 109, 120, 166, 195, 274, 316, 319
- 'Dubourdieu,' 169, 202
- Dufferin, Lord, 320
- 'Duguay Trouin,' 201, 261, 262
- 'Duguesclin,' 113, 167, 199
- 'Duilio,' 51, 61, 114, 121, 335, 352
- 'Duncan,' 297
- 'Dupuy de Lôme,' 174, 182, 199, 223, 364
- 'Duquesne,' 163, 169, 201, 251, 254, 260, 262
- EAST Indian station, desertion comparatively rare on the, 59
- 'Edinburgh,' 102, 110, 114, 138, 149, 150, 166, 178, 194
- Edinburgh, Duke of, 57, 218
- Edmondstone, Sir W., 21
- Egypt: the bombardment of Alexandria, 82; the subsequent operations of the naval and military forces, 83, 86, 87; precautions against a hostile occupation of, in war time, 358
- Elgar, Mr., on dockyard work and workmen, 352
- Elliott, Admiral, on ship designing, 45, 46, 48, 264; on the policy of

- building large ironclads, 275, 276
 Elswick Company, manufacture of 100-ton guns for the Italian Navy by, 276
 Elswick Works, resources of, 271
 'Emerald,' 203, 256
 Employers and Workmen Act, 1875, extension of, to seamen in British waters, 91
 'Encounter,' 261
 'Engineer,' the, cited on the resistance of inclined armour, 328
 Engineer officers, 28, 29
 Engineer-in-Chief of the Navy, responsibility and salary of, 73
 English Channel, command of, in war time, 357
 Ericson (designer of the 'Monitor'), 375
 Escott, Mr., 90
 'Esmeralda,' 369
 Euphrates Valley Railway, evidence taken by the Select Committee on, cited, 83
 'Euryalus,' 202, 260, 261, 302
 'Excellent,' 12
 Expenditure, naval, 128, 135, 137, 138, 143-147, 176, 177, 181-186, 213-228, 232, 261-264, 274, 298, 300-302

 FELLOWS, Admiral, 69
 'Ferdinand Max,' rams and destroys the 'Ré d'Italia,' at Lissa, 376
 Fitzgerald, Captain, 192
 Flying squadrons, 9
 'Formidable,' 113, 166, 194, 222, 352, 379
 'Foudroyant,' the (renamed 'Courbet'), 110, 113, 125, 166, 335
 France: as a maritime power, 36, 38; the Navy and naval expenditure contrasted with that of Great Britain, 6, 34, 95, 96, 99-106, 108-118, 120, 121, 143, 147, 153, 163-169, 174-178, 182, 183, 185, 188-190, 194, 217, 220-228, 233-235, 255, 260-262, 302, 304, 360-364, 381; naval shipbuilding, 40, 60, 61, 81, 100, 103, 110, 111, 113, 125, 126, 145, 153, 158, 174-177, 182-185, 189, 190, 207, 211, 236, 257, 260-262, 280, 286, 315, 341, 364, 370, 372, 373; the system of ship-designing, 54; the naval administration, 56, 70, 72, 101; wages paid in dockyards, 101; great increase in number of torpedo-vessels, 105; vessels for coast defence, 111, 121, 376; calibre and penetration of naval ordnance, 161, 166-169; thickness of ships' armour, 166-169, 335; tonnage of mercantile marine, 173, 270; armaments of the Navy, 174, 260, 261, 264, 276, 346, 379; system of manning the Navy, 187, 188, 239; subsidies to the mercantile marine, 229; policy in case of war with Great Britain, 242; novel type of steam-ram, 284; rate of naval construction and cost of work, 352, 353; balloons supplied to the 'Formidable,' 379
 'Freya,' 254
 'Friedland,' 34, 110, 121, 163, 167, 195
 Froude, Mr., on the Admiralty and ship designing, 55, 303
 'Fulminant,' 110, 121, 125, 167, 197, 208
 'Furieux,' 113, 197, 208
 'Fury,' 276, 322

 'GALATEA,' 199, 223, 256
 'Galissonnière,' 34
 Gambetta, M., 349
 Germany: shipbuilding policy, 34, 40, 60, 61, 81, 121, 254, 277, 285, 307, 315, 364, 370; the construction of monitors aban-

- doned, 43; vessels for coast defence, 50; increase in number of torpedo vessels, 51; armoured tonnage in 1884, 99; great increase in number of torpedo vessels, 105; naval designing and construction, 126, 254, 277, 285, 307, 315, 342, 364, 370; tonnage of mercantile marine, 173, 270; subsidies to the mercantile marine, 229; size of recent ironclads, 235; relative strength in unarmoured cruisers, 255; merchant cruiser auxiliaries of the Navy, 381
- Gervais, Admiral, 188
- Gervaise, M., on the true policy of naval construction, 280
- 'Giovanni Bausan,' 369
- Gladstone, W. E., 75, 76, 91
- 'Glatton,' 59, 165, 198
- 'Gloire,' 334
- Goldsbrough, Admiral, on the value of steam rams, 42, 278, 284, 324, 325, 349
- 'Gorgon' class of vessels, defects of, 59, 60
- Gorst, Mr., 130
- Goschen, Mr., 3, 4, 79, 80; on the policy of building smaller ships, 252, 253, 268, 376
- Gougeard, Admiral, on the French Navy, 125; his design for a torpedo-ship, 349
- Graves, Mr., on the size and speed of unarmoured ships, 244
- Gravière, Admiral Jurien de la, on the policy of destroying an enemy's commerce, 39; 290, 307, 315; on the value of rams, 326
- 'Great Eastern,' 303
- Grey, Sir Frederick, 24
- Grivel, Baron, his 'De la Guerre maritime' quoted, 37-39, 42; on French naval policy in case of war with Great Britain, 242
- 'Grosser Kurfürst,' in collision with the 'König Wilhelm,' 376
- 'Guerrière,' 256
- Gunboats, 156, 183, 184-186, 216, 225, 226, 248, 347
- Guns; number and calibre of, on ironclads, 49; 18-ton guns not powerful enough for an engagement with a first-class ironclad, 49; light guns best for cruisers, 261; disadvantages of big guns, 263; uncertainty of aim on ship-board, 317; calibre and penetration of, 129, 131, 137, 138, 148, 152, 161, 174, 251, 252, 262, 263, 267, 275, 302, 313, 328
- HALL, Admiral, 69
- Hamilton, Lord George, 215, 230, 233, 364
- 'Hamilton' programme of ship-building, the, 356; strength of the Navy on the completion of, 383
- 'Hansa,' 35
- Haulbowline Graving Dock, 106
- Hay, Sir John, 24, 57
- 'Hector,' 196, 207
- Henderson Brothers (Anchor Line), 271
- 'Hercules,' 109, 121, 166, 195, 247, 253, 273, 280, 294, 317, 348, 374
- 'Hero,' 102, 114, 125, 138, 148, 151, 158, 167, 194, 222
- 'Heroine,' 156, 203
- 'Hertha,' 255
- Hicks-Beach, Sir Michael, 139
- 'Hirondelle,' 163, 201
- 'Hoche,' 113, 166, 194, 222, 352
- Hong-Kong, grant of a Treasury loan to a private company for building a dock at, 106, 170
- Hood, Admiral Sir Arthur, 182, 193, 221; on the distribution of the armour on battleships, 342, 343, 344
- Hood, Captain, 264
- Hornby, Admiral, 49, 57, 59, 60, 142, 159, 162, 192, 219, 220, 221

- Hoskins, Sir Anthony, on belted cruisers, 345
- 'Hotspur,' 110, 121, 167, 197, 208
- 'Howe,' 114, 124, 137, 158, 166, 194, 222, 235, 378
- 'Huascar,' in action with H.M.S. 'Amethyst' and 'Shah,' 328, 332, 335, 368, 369
- Hunt, Ward, 51
- 'ICARUS,' 158
- 'Idaho,' 256
- 'Immortalité,' 199, 223, 345
- 'Impérieuse,' 102, 114, 124, 149, 148, 153, 158, 167, 199, 210, 377, 379
- 'Inconstant,' 104, 169, 201, 245, 246, 248, 251, 254, 259, 260, 263, 264, 265, 288, 289, 290, 301, 302, 311
- India: communication with, by the Suez and Cape routes, 83, 84, 358; importance of providing a dock at Bombay, 107
- 'Indiana,' 190
- 'Indomptable,' 113, 167, 194
- 'Inflexible,' 35, 48, 49, 64, 88, 109, 120, 122, 166, 195, 274, 286, 313, 316-319, 321, 323, 329-340, 378, 379
- 'Inflexible' Committee, report of the, 321, 333; the unarmoured ends, 333, 334; thickness of armour on protected parts, 335; alterations suggested, 336
- Institute of Naval Architects, 50, 248, 290, 298, 322, 325, 355; 'Transactions' quoted, 324
- Invasion, best means of defence against, 356
- 'Invincible,' 33, 110, 121, 167, 195
- Ireland, the land question, 85
- 'Iris,' 52, 154, 169, 174, 200, 303, 339
- Irish Channel, command of, in war time, 357
- Ironclads: designs and stability of, 7-9; use of sails on, 10; 'Inflexible' type of vessel, 30, 40, 43; dimensions of, 48, 88, 148, 149, 150, 234, 275-277, 279-281, 283-287, 318; armaments of, 49, 88, 122, 129, 149, 166, 167, 189, 317, 343; tonnage of, contrasted with foreign tonnage, 120, 121; rapidity of construction, 124; in commission, completing or building, and ordered (1889), 194-196; necessity of improvements to older vessels, 218, 235, 373; the ironclad fleet, 273-282; ironclads and rams, 276-278, 283-287, 294, 295, 314, 324-327, 337; defence against torpedoes, 308, 314, 320, 322-324; defects of the 'Inflexible,' 318; auxiliaries to, 361, 362, 372, 373; balloons fitted to the French ironclad 'Formidable,' 379. *See* Armour, and Designing and construction
- 'Iron Duke,' 110, 121, 167, 195; rams and destroys the 'Vanguard,' 285, 295, 376
- Ismailia, 83
- 'Italia,' 61, 62, 63, 103, 115, 352
- Italy: designing and construction of ships, 61, 62, 63, 88, 121, 126, 235, 342, 370, 371; armoured tonnage in 1884, 99; tonnage of mercantile marine, 173; subsidies to the mercantile marine, 229; size of guns, 276, 346; thickness of armour, 335; rate of construction, 352
- JAPAN, belted cruisers constructed for, 53
- Joinville, Prince de, on French naval policy, 44
- 'KEARSAGE,' in action with the 'Alabama,' 53
- Key, Admiral Sir Cooper, 57, 59, 69
- Keyham Barracks, 106

'König Wilhelm,' 121; in collision with the 'Grosser Kurfürst,' 376
King, Mr. (head of the U.S. Bureau of Steam Engineering), on the British Admiralty, 32; his report on the ironclads of European navies cited, 64; his opinion of the 'Inflexible,' 319
Krantz, Admiral, 218

Laird Brothers, 271

'Landrail,' 156

Lang, Oliver, on the system of recruiting officers in dockyards, 66

Lauderdale, Lord, quoted, 250

'Leander,' 154, 155, 156, 201

Lennox, Lord Henry, 123, 306

'Lepanto,' 61, 103, 115, 352

Liberal party, work of the, 92

Line of battle ships, best type for, 44

Lôme, M. Dupuy de, reduction of armoured surface in ships by, 334

Look-out ships, 360, 372

'Lord Warden,' 121, 196

'Louise,' 254

Lowell, James Russell, quoted, 92

MACHINE guns, 131, 150

Machinery, protection of, 53; causes of breakdown, 377; deficient weight per I.H.P. of engines in the Navy, 378

Mackrow, Mr., designer of the 'Vasco de Gama,' for the Portuguese Government, 309

Maclean, Mr., 343

Macomb, Captain, 7

'Magdala,' 114, 198

'Magenta,' 113, 166, 196, 207, 222, 352

'Magicienne,' 174, 200, 244, 249, 250, 261

'Magnificent,' 234

Mahan, Captain, quoted, 356

'Majestic,' 234

Malta, the shipbuilding shop at, 106; the dockyard, 170

Manning the Navy, 187, 188; insufficiency of men, 238; the reserves, 239

'Marceau,' 113, 166, 188, 194, 222, 352

Marchal, M., 334

'Marengo,' 110, 121, 163, 167, 188, 195

Marines, the, in the operations in Egypt, 83; reduction in numbers and improvement in pay of officers in 1882-3, 87, 88

Marmora, Sea of, 51, 58, 60

'Massena,' 235

Master shipwrights, 17, 18, 20, 21, 23

'Medea,' 174, 200, 224, 350

Mediterranean, the, 59, 87

Mediterranean fleet, 9, 10, 50, 57; deficient in rams and torpedo vessels, 50

'Medusa,' 174, 224, 350, 378

'Medway,' 347

'Mégara,' report of the Commission on the loss of the, cited, 17, 18, 20, 21, 65, 67, 68

'Melita,' 183, 225

Mercantile marine: average pay of seamen, 58; its value as an auxiliary to the Navy, 86, 87, 97, 116; tonnage of, 173, 270, 271, 309; probable transfer of, to neutral flags in time of war, 357; increasing proportion to the aggregate tonnage of the world, 384

Merchant steamers, speed of, 256; as auxiliaries to the Navy, 158-160, 178, 229, 237, 269, 270, 381

'Mercury,' 52, 154, 169, 174, 200, 303

'Merrimac,' 255

'Mersey,' 123, 155, 156, 201, 216, 256, 361, 375

'Meteor' (Prussian) in action with the 'Bouvet' (French), 53, 260

'Miantonomoh,' 43, 61

- 'Milan,' 163, 169, 174, 200
 Milne, Sir Alexander, 24
 'Minotaur,' 27, 41, 111, 198, 209, 280, 346
 'Modeste,' 261
 'Monadnock,' 61
 'Monarch,' 7, 110, 121, 167, 195, 247, 317
 'Monitor,' 375
 Monitors, value of, for coast defence, 42, 43, 374; the construction of, abandoned by Germany, 43; Russian, 43, 50; at the bombardment of Charleston, 375
 Morin, Signor, on the composition of a fleet, 382
 Morley, Earl of, 137
 Murray, Andrew, on the management of the dockyards, 18
- NAPOLEON I., 2, 39**
 Naval administration. *See* Admiralty, Dockyards, and Navy
 Naval designs, report of Committee on quoted, 264, 265, 268, 275, 278, 281, 302, 303, 308
 Naval engagements: 'Meteor' (German despatch boat), and the French cruiser, 'Bouvet,' 260; the battle of Lissa, 326, 327, 377; H.M.S. 'Shah' and 'Amethyst,' and the Peruvian ironclad 'Huascar,' 328, 332, 335, 368, 369
 Naval expenditure. *See* Expenditure
 Naval manœuvres, the, 218, 221
 Naval shipbuilding. *See* Designing and construction
 Naval university, desirability of a, 13
 'Navarin,' 364
 Navigating officers, suggested abolition of, 11-13
 Navy, the, contrasted with foreign Navies, 6, 34, 35, 39, 60, 61, 94, 97, 98, 99, 100, 103, 105, 108-118, 120-123, 145-147, 163-169, 173-176, 182, 183, 185, 188-190, 233-236, 255, 359-364; employment of, in peace time, 13; average annual expenditure on, 1858-73, 26; opinions of foreign experts on, 31-33; types of vessels best adapted for modern warfare, 37-46; deficiency of ships for inshore operations, 47; additions to, provided for in 1878-79, 51; need of vessels constructed for special services, 52; pay of seamen, 58; loss by desertion, 58, 59; condition of ironclads in 1870, 78; services of, in Egypt, 82, 83, 86, 87; unfair criticisms on, 93, 94; its efficiency against foreign combinations, 114, 115; annual statement on (1884), 119-140; administration of, 141-172; manning of, 142, 187, 188, 238-240; mercantile auxiliaries, 158-160, 178, 229, 237, 269, 270, 271, 310, 380; actual strength (1889), and expenditure necessary to secure its supremacy, 191-231; vessels in commission and building (1889), 194-206; unarmed vessels, relative importance of size and speed, and cost of the most useful types, 241-272; the training of officers, 296, 297; its duties in war—defence against invasion; protection of commerce—operations necessary for, 356-359; need of more first-class cruisers, 380; strength on completion of the 'Hamilton' programme, 383
 'Nelson,' 49, 52, 110, 118, 121, 150, 167, 199, 316
 Nelson, Lord, 2, 219, 256, 296, 356, 366
 'Neptune,' 109, 120, 166, 195
 'Neptune' (French), 113, 166, 194, 222, 352
 'New York,' 236
 'Niagara,' 255

'Nile,' 179, 194, 222, 348
 Noel, Captain, cited, 307
 North German Lloyd Company,
 381
 'Northampton,' 49, 107, 110, 121,
 167, 199, 316
 Northbrook, Lord, 111, 124, 180,
 210, 215, 230
 Northcote, Sir Stafford, 117
 'Northumberland,' 199, 209, 218

'Océan,' 110, 121, 163, 167, 195
 Officers of the Navy, suggestions
 for employment of, in peace
 time, 13; training of, 296; desirability of cruising under sail,
 297,
 'Onondaga,' 95, 196, 363
 'Opal,' 203, 302, 303
 'Oregon,' 159
 'Orion,' 110, 121, 167, 197, 208
 'Orlando,' 199, 223, 256, 345
 'Osborne,' 246, 289
 'Osprey,' 295

PAGET, Lord Clarence, 241, 247, 248;
 on dockyard management, 69
 Pakington, Sir John, 4, 76
 Pembroke Dockyard, salary of chief
 constructor, and aggregate of
 wages paid, 69; success in building
 ships within the estimates,
 69; 130
 'Penelope,' 198, 208
 Persano, Admiral, on the value of
 steam rams, 42, 326
 'Persia' (merchant steamer), 256
 Peruvian navy, gunboats for, constructed in English yards, 309
 'Peter the Great,' 35, 121, 195, 280,
 286, 335, 362
 'Piemonte,' 346, 350
 'Plymouth,' 7
 'Polyphemus,' 114, 132, 133, 154,
 162, 169, 175, 205, 212, 216, 349,
 376

Porter, Admiral (U.S. Navy), on the
 British fleet, 31, 33; on commerce
 destruction in war, 37; on
 modern naval warfare, 41, 43, 50;
 on the class of ships necessary
 for the destruction of commerce,
 242, 243; on the dimensions and
 speed of vessels, 248, 259, 266;
 report on U.S. Navy in 1870
 quoted, 271; on the value of the
 ram and the torpedo, 277, 284,
 285, 294; on the speed of ships,
 298; on United States shipbuilding
 policy, 307, 311

Portsmouth Dockyard: subordinate
 position of chief constructor, 67;
 salaries of chief constructor and
 chief engineer, 68, 69; number
 of men employed and aggregate
 of wages, 68, 69; extension works
 at, 106; 130

Portuguese Navy, ironclads for,
 constructed in English yards,
 293, 309

Price, Captain, on the uncertainty
 of gun practice on shipboard,
 316, 317

Privateers, 245, 246, 250, 262, 339
 'Puritan,' 61

'RALEIGH,' 52, 169, 201, 245, 250,
 252, 259, 260, 290, 311

Ramleh, 83

Rams, steam, of moderate tonnage
 most formidable, 42; deficiency
 of, in the Mediterranean Fleet,
 50, 51; torpedo, 132, 133; growing
 importance of, 276, 307;
 power of, 278, 284, 285, 376;
 armour protection for vital parts,
 284; as tenders to ironclads,
 324; value of, for harbour defence,
 325; effect of, at the
 battle of Lissa, 326, 327; torpedo
 launches for, 324, 327; opinions
 of experts as to their value, 326,
 327, 349

'Rattlesnake,' 205, 212

- Raymond, M. Xavier, on the Board of Admiralty, 71
 'Ré d'Italia,' destruction of, by the ram of the 'Ferdinand Max' at Lissa, 376
 'Redoubtable,' 34, 100, 109, 121, 195, 280
 Red Sea, work in, unsuited to English crews, 354
 Reed, E. J., 8; on dockyard management, 17, 18, 19, 72; on the salary of the chief constructor of the Navy, 73; on trial speeds of ships, 247; on ships for protecting commerce, 265; his designs, 286, 294, 295, 334, 335, 337; ironclads constructed by, for the Chilian Government, 308; on ironclad construction, 318, 323, 324, 329, 330, 342
 Reed, Sir Edward, on the Navies of England and France, 112, 141, 152, 209
 'Reine Blanche' in collision with 'Thetis,' 376
 Rennie, Messrs., gunboats constructed by, for the Peruvian Government, 309
 'Renown' (renamed 'Victoria'), 148, 151, 166, 234
 Repairs to battleships, 68, 77, 88
 'Repulse,' 121, 196
 'Requin,' 113, 167, 194
 'Revenge,' 297
 'Revue des Deux Mondes,' quoted, on the relative composition of a fleet, 362
 'Richelieu,' 110, 121, 163, 167, 195
 'Rigault-de-Genouilly,' 202, 261
 'Rinaldo,' 253
 'Rio de Janeiro,' 374
 Ritchie, Mr., 135
 River Plate, desertion in the, 59
 Robeson, Mr., 10
 Robinson, Sir Spencer, 17, 20, 50; memorandum by, on dockyard management cited, 65; report on naval administration, 75, 77, 78, 79, 80, 246, 248, 250; on the requirements of modern naval warfare, 277, 288, 292, 294, 309; on defence against the torpedo, 323
 'Rodney,' 88, 114, 137, 158, 166, 194, 222
 'Rover,' 202, 250, 260, 261
 Royal Naval Artillery Volunteers, 142
 Royal Naval Reserve, the, 142, 238, 239
 Royal United Service Institution, 317, 341
 Rule, Sir William, 20
 'Rupert,' 110, 121, 167, 197, 208, 218, 274, 278
 'Rurik,' 236, 364
 'Russia' (Cunard liner), 27, 339
 Russia: shipbuilding, 35, 40, 121, 126, 190, 207, 235, 236, 280, 307, 315, 342, 364, 370; comparative strength of the Navy, 35, 194-210, 233-235, 360-364; number of monitors possessed by, 43; ironclads for coast defence, 50; increase in number of torpedo vessels, 51; armoured tonnage in 1884, 99; belted cruisers, 123; speed of ships, 194-206, 360, 361; vessels of the Navy in commission and building (1889), 194-206; recent naval expenditure, 233; tonnage of the mercantile marine, 270; thickness of armour, 335
 Ryder, Admiral, on the 'Gorgon' class of vessels, 9, 10; on ship designing, 45, 46, 48; on the policy of building large ironclads, 275, 276
 'SACHSEN,' 51
 Sail power, as an auxiliary to steam, 19, 379
 'Salamis,' 311
 Samuda, Mr., 306, 331
 Sandhurst, Lord, on the value of the Suez Canal to Great Britain, 83, 84

- 'Sans Pareil,' 148, 150, 166, 178, 194, 222, 346
'Sardegna,' 344, 378
Sartorius, Sir George, 51
Scientific Instruction, Royal Commission on, report cited, 55, 73
'Scotia' (Cunard liner), 28
Scott, Captain, cited, 316, 317, 325, 326
'Scout,' 132
Seamen: cost of training an A.B., 58; pay of, in the Navy, 58; pay of, in the mercantile marine, 58
Seamen Pensioners' Reserve, 142, 238
Sebastopol, effect of experience gained in the bombardment of, on naval construction, 82
Seely, Mr., 16, 52, 306, 331
Seppings, Sir William, 20
'Sfax,' 163, 164, 169, 201
'Shah,' 52, 201, 245, 253, 259, 260; in action with the Peruvian ironclad 'Huascar,' 328, 332
'Shannon,' 40, 52, 110, 121, 150, 167, 199, 253, 279, 316
'Sharpshooter,' 205, 212, 226, 361
Shaw-Lefevre, Mr., 75, 81
Shipwrights, wages of, 26
'Sicilia,' 344
Smart, Admiral, 66, 68
Smith, W. H., 130, 131, 133, 134, 138, 149
'Solferino,' 334
Somerset, Duke of (the late), 3, 4, 24, 65, 75
Spain, ironclads in course of construction, 236
Speed in ships, large tonnage not essential for, 246; relative cost of increased speed, 248-252
Speed rates of war-vessels, 88, 97, 98, 103, 104, 122, 129, 131, 132, 133, 148, 151-157, 166, 167, 174, 175, 177, 182-185, 194-206, 210, 244-251, 261, 264, 265, 288-292, 302-304, 345, 360, 361
Spencer, Earl, 232
'Staunch,' 7
Steers, George (American ship-builder), 255
Stewart, Sir Houston, 67
'Suchet,' 174, 182, 204, 211, 224
Suez Canal, its value as a means of communication with the East, 83-85, 338; objections to its use in war, 357
'Suffren,' 34, 110, 121, 163, 167, 195
'Sultan,' 109, 121, 166, 195, 253, 273, 294, 374
'Superb,' 109, 121, 166, 195
'Surcouf,' 174, 204, 211, 224
'Surprise,' 169, 201
'Swiftsure,' 110, 121, 167, 195, 279
Symonds, Sir Thomas, 47; on naval expenditure in England and France, 101; on our ship-building policy, 103; 192

'TAGE,' 182, 200, 223
'Taureau,' 196, 363
'Téméraire,' 109, 121, 166, 195, 316
'Tempête,' 34, 168, 197
'Terrible,' 113, 167, 194
'Terror,' 61
'Thames,' 174, 200, 216
Thames Ironworks, small Portuguese ironclad built by, 293
'Thétis,' 196; in collision with the 'Reine Blanche,' 376
Thompson, Sir William, 53, 55
Thornycroft launch, the, 327
'Thunderer,' 35, 79, 100, 109, 120, 166, 195, 274
'Thusnelda,' 254
'Tigre,' 196, 363
'Tonnant,' 113, 168, 176, 197
'Tonnerre,' 34, 110, 121, 125, 167, 197
Torpedo-boat catchers, 157
Torpedo-boat destroyers, 238
Torpedo rams, 132, 133, 179, 212, 376
Torpedo vessels, deficiency of, in the Mediterranean Fleet, 50,

- 51; great increase of, in foreign Navies, 51, 105, 123, 164; defence against, 127, 157; importance of, 132, 268; armament of, 156, 349; dimensions of, 157, 374; sphere of action, 161, 162, 338; in commission and construction (1889), 205, 206; American idea of best form of, 285; torpedo gun-vessel auxiliaries to battleships, 105, 115, 361, 362, 373; small boats for harbour defence, 374, 375
- Torpedoes, the best means of defence against, 50; growing importance of, 276, 277, 285; power of, 277, 327, 328; defence against, 308; vessels destroyed by, in warfare, 374; the spar torpedo, 375
- Touchard, Admiral, on the best type of cruiser, 254
- 'Tourville,' 163, 169, 201, 260
- Tracy, Hanbury, on the speed required in cruisers and despatch vessels, 244
- Trade routes, protection of, in war time, 339, 357-359, 383
- 'Trafalgar,' 179, 194, 222, 348, 352
- Transatlantic Line, 381
- Trevelyan, Mr., on the policy of Lord Northbrook as First Lord, 123, 127
- 'Trident,' 110, 121, 163, 167, 195
- 'Triomphante,' 34, 195
- 'Triumph,' 110, 121, 167, 195
- Tryon, Admiral Sir George, 188, 239
- 'Turenne,' 110, 121, 167, 199
- Turret ships, 10, 338, 346
- United Kingdom, 6; shipbuilding policy, 10, 40, 60, 61, 126, 236, 267, 242, 248, 255, 256, 280, 285, 304, 307, 314, 315, 342, 348, 370, 371, 376; adoption of sail power in time of peace, 10; appointment of skilled mechanics as engineer officers, 28; mode of presenting annual statements, 31; as a maritime power, 36; monitors for coast defence, 50; increase in number of torpedo vessels, 50, 51; pay of seamen in mercantile marine, 58; tonnage of the mercantile marine, 173, 270; subsidies to the mercantile marine, 229; frigates and corvettes, 255, 256; Board of Steam Machinery Afloat, report on the 'Wampanoag' corvette, 257; on the condition of the fleet, 258, 259; condition of the Navy in 1870-1, 258, 259; blockade of the coasts of the Southern States in the War of Secession, 262; the 'Alarm' (torpedo vessel), description of, 267; resources of naval yards, 271; novel type of steam ram proposed, 284; measures taken for torpedo attack and defence, 327; reconstruction of monitors, 375; retention of sail power in cruisers, 380
- 'United States Army and Navy Journal' quoted, on torpedo-boats, 327
- United States Naval Department, on the variety of European types of battleships, 369
- 'VALIANT,' 27, 196, 207
- 'Vanguard,' destroyed by collision with the 'Iron Duke,' 284, 285, 295, 376
- 'Vasco de Gama,' 309
- 'Vauban,' 113, 167, 199
- 'Vautour,' 204, 225, 353
- 'UMBERTO,' 344
- Unarmoured ships. *See* Cruisers, unarmoured
- United Service Institution, 59, 64
- United States: naval administration, 5; the Navy contrasted with those of France and the

- 'Vengeur,' 168, 176, 197
 'Vesuvius,' 205, 212, 267, 268, 277
 'Vicar of Wakefield' quoted, 90
 'Victoria' (formerly 'Renown'),
 178, 194, 222, 346, 378
 'Victorieuse,' 34, 195
 'Victory,' 256, 296
 Victualling and clothing, cost per
 man (1866-67 to 1871-72), 3
 Villeneuve, Admiral, 2, 366
 'Viper,' 95, 198
 'Vixen,' 95, 198
 'Volage,' 104, 201, 246, 248, 252,
 260, 261, 263, 264, 265
 Von Stosch, General, 43
 WADDILOVE, Captain, 245 ; on ships
 for protecting commerce, 264
 'Wampanoag,' 256, 257 ; report
 of the United States Board of
 Steam Machinery Afloat, on the,
 257
 'Warrior,' 7, 111, 199, 209
 'Warspite,' 102, 114, 124, 153, 158,
 167, 192, 210, 377, 379, 380
 Washington, Captain, 11
 'Waterwitch,' 95, 112
 Weyl, M., 381
 White, Mr., on the fighting effi-
 ciency of the 'Admiral' class of
 battleships, 342, 343, 344 ; on
 the dimensions for cruisers,
 377
 Wilson, Captain, on the pay of
 seamen in the Navy, 58
 Wolseley, Sir Garnet, 83

END OF THE FIRST VOLUME.

PRINTED BY
 SPOTTISWOODE AND CO., NEW-STREET SQUARE
 LONDON